ELECTRICAL REVIEW

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Price of Coal

Taking Account of Heat Values

IT is nearly twenty years since the late Lord Melchett urged that coal should be sold to a specification and classified to an agreed standard. As a result of developments in the meantime, Dr. E. S. Grumell has put forward (as we have already reported) practical proposals for establishing the essential pre-requisite of a price structure based upon the useful characteristics of the various types of coal.

The electricity supply industry would gain probably more than any other from a technical-commercial system of pricing which took proper account of the value of every grade of fuel. This industry is the largest single user of coal, the cost of which already forms upwards of two-thirds of the total cost of generation, including capital and other fixed charges, and pays far more per ton than can be justified by any economic standards.

Inferior and Expensive

The general issue is the simple one that coal is required merely as a source of heat units for conversion to electricity. The number of B.Th.U. in a pound of coal of the kinds burned in power stations is considerably below the average of all types mined, yet the difference in the prices paid has become progressively less and now approaches the negligible. Moreover, the combustion of this inferior coal has entailed a vast amount of research and additional capital, operating costs and maintenance charges for which due allowance ought to be made but is not.

Causes of the present wholly unsatisfactory position can be traced back to the tendency, noted by Dr. Grumell, for the price of fuel to advance as soon as suitable combustion appliances and processes have been developed. Freedom of negotiation (based on the important consideration that most of the power-station coal would otherwise have been a drug on the market) remained, however, until 1935, when the prices fixed under the Coal Mines Act were raised to a greater extent than to users generally. During the war the pernicious system was introduced (and has been continued) whereby increases at a flat rate per ton, irrespective of heating value, have been imposed.

Industrial Consumers Penalized

These increases have had to be met, through "coal clauses," by industrial consumers, discouraging the use of electricity from the grid and thus tending to increase the consumption of fuel of better quality that could be allocated to other purposes. They have also created the anomaly that the price per 1,000 B.Th.U. increases as the ash content of the coal goes up. This discrimination, in effect, against electricity supply will become more severe if, as a result of greatly extended pulverized-fuel firing in new power stations, more use can be made of the 10 million tons of natural coal dust produced per annum (more with further mechanized coal cutting) on the lines indicated by Dr. R. Lessing at the Pulverised-Fuel Conference last June.

Detailed investigations that would lead to a price structure as envisaged by Dr. Grumell should be an immediate concern

of the National Coal Board. The devising of the efficiency and utility factors which he proposes may take some time, but that should not hold up the putting into operation at the earliest possible moment of a scheme of primary evaluation based on comparative heat units.

B.E.A. and E.D.A.

LORD CITRINE'S encouraging remarks at the recent E.D.A. - E.A.W. conference regarding the future of those two organizations are being followed up by a letter from the British Electricity Authority empowering electricity undertakings to continue their subscriptions to E.D.A. for a further year. Although at the end of that time the position will be "subject to review," we are confident that the B.E.A. will then decide that the Association's work must be carried on and, as we have already said, there will be little point in setting up an entirely new organization for the purpose.

Practical Training

As the scale of electricity supply increases with new technical developments in the offing, so does the need for high technical qualifications among the administrative and operating staffs. The discussion of the Report on Practical Training at the Institution of Engineers last week was well timed in view of the change in the organization of the service and should be of material assistance to the British Electricity Authority. Especially to be noted is the view expressed in the Report that part of the training should be received in a manufacturer's works. This adds considerably to the variety of experience obtainable by an apprentice before taking up a position in any one branch of his profession.

Steel for Power Plant

IN spite of warnings, the Government is determined to curtail the power plant programme originally laid down for the next few years. There was confirmation of this at the recent Ministry of Supply press conference on the standardization of turbo-alternators, referred to last week, and on November 20th Mr. Marquand, Paymaster-General, went a stage further. His subject was the allocation of steel supplies and he said that the new scheme was one for "a gradual paring down of the quantity of priority now allowed to the fuel and power programmes and the like." Asked by Mr. F. J. Erroll how much this would delay the fuel and power priority programme, Mr. Marquand indicated that "no one would be further delayed by the introduction of this new system." It is not clear how this can be the case if priorities are "pared down."

Easing World Trade

PRELIMINARY examination of the twenty tariff schedules appended to the Geneva Agreement on Tariffs referred to in this issue indicates that so far as electrical plant and equipment are concerned this country stands to gain as much as it gives. The United States, particularly, has agreed to make substantial reductions in duties which may possibly enable British electrical manufacturers to gain much-needed dollars. We have conceded a reduction in the duty on heating and cooking appliances but apart from this it seems that the position is little changed. Import duties are, however, not the only handicaps, nor perhaps the greatest. It remains to be seen how far the contracting parties will remove other disabilities which hinder free interchange of goods — restrictions, quotas, special taxes, etc.—as they have undertaken to do, or to what degree they will shelter behind the provisos or escape clauses in the agreement.

Electrical Drainage

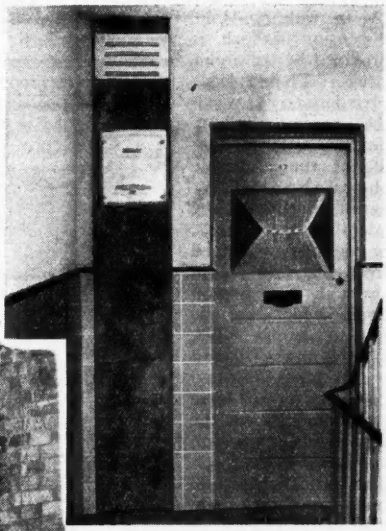
DURING the past seven years electro-osmosis (i.e., a forced movement of water between electrodes in the ground) has been applied to arresting earth slips in foundations in fine-grained water-logged soils. The problems involved are discussed in a new Building Research Technical Paper, No. 30, of the Department of Scientific and Industrial Research (Stationery Office, 9d. net). From this it appears that the consumption of energy is from 0·4 to 1·0 kWh per cu metre excavated from large cuts, which contractors have not found unduly expensive. The method appears to have advantages where the capillary forces acting on the water in silts prevents the adoption of ordinary means of lowering ground water. Another possibility is that the earth pressure behind sheet piling could be decreased in a similar way.

Wiring Blocks of Flats

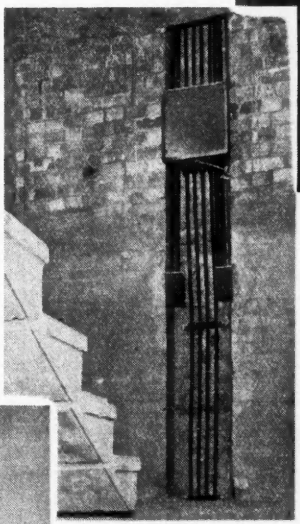
Electricity Distribution in Three Dimensions

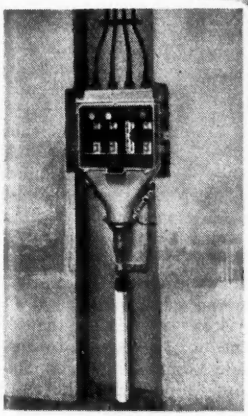
THE trend in town-planning for the denser residential areas is towards community centres comprising several blocks of flats with shopping and recreational facilities. Already in London blocks of flats of four and more floors are completed, or being built, and similar blocks with up to eight floors are projected. The density of population will be of the order of 100,000 per sq mile and upwards in contrast to urban or semi-rural housing schemes with perhaps only four houses to the acre and a density of 10,000 per sq mile where the undertaking's cables end at the lead-in or intake point.

Modern flat-blocks are the opposite extreme; in them distribution of electricity *upwards* will be unique, for it will be almost as extensive in that sense as it will be laterally. The underground system is prolonged into vertically installed mains from which the several consumers in the building will be served.



Hardwood chase covers showing twelve-way distribution box and ventilator above





Twelve-way distribution box showing the rising mains, cleating, earthing and sub-circuit conduit inspection boxes

Incoming service box, 0·3 sq in. four-core p.i.l.c. and armoured cable, fuse-chamber cover removed

It is for such installations that the Henley rising mains system was developed, being suitable also for office buildings and multi-floor industrial premises needing numerous low-voltage circuits of up to 60 A on the several floors.

In the case of new flat-dwellings, the supply authority indicates on the architect's plan of the building the lateral conduit runs and the positions and dimensions of the vertical chases for the rising mains. The installation of the mains and the ancillary equipment is more or less standardized routine.

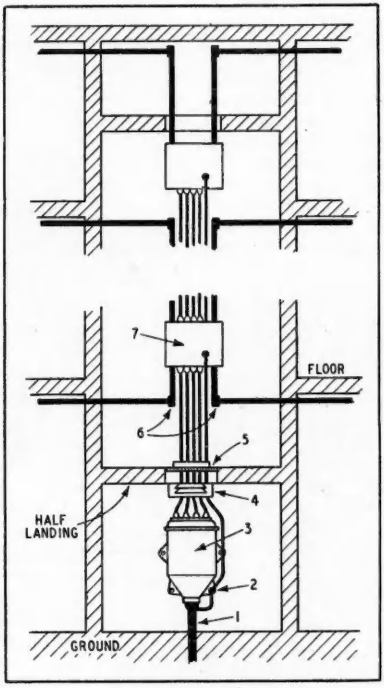
The system complies with the requirements of the London County Council and it has been adopted for artisan flat-dwellings in London boroughs; for example, in Bethnal Green, Islington, Hackney and Hornsey, installations have been completed and several boroughs have adopted the system for

flat-dwellings which are either projected or in course of erection.

The protected solid annealed copper conductors are cleated in a vertical chase 13½ in. wide by 4½ in. deep (standard brick dimensions) which is provided by the architect. Three line conductors with the neutral and a heavy earthing conductor run alongside throughout. At various floor levels the lateral services (v.i.r. in conduit) are tapped from the rising main through distribution boxes which provide up to twelve 60-A single-phase fused ways and are so disposed as to serve two floors, except the upper box which supplies only one floor. The vertical chases are built into the main stairway and the boxes are accessibly disposed on the half-landings.

The system has been standardized for two sizes of three-phase, four-wire rising mains of 0·1 and 0·2 sq in. with respective continuous ratings of 200 A and 300 A per phase, at capacities of 144 kW and 216 kW at 415 V and unity p.f. The protection consists of varnished cambric and compounded cotton tapes finished with fire-resisting compounded braid. The conductors are secured in position by insulated multiple cleats, which comply with the I.E.E. Regulations for the Electrical Equipment of Buildings (No. 401 B) and, where the mains pass through floors, the cleats are combined with fire baffle plates to comply with Reg. 401 H. The conductors are pre-set forward ¾ in. between cleating positions to provide for expansion and contraction.

In the building basement the incoming cable is made off in a cast-iron service fuse box having a cable-sealing chamber. Its dimensions are such that it can be accommodated within the rising mains chase, widened to 17 in.; the fuse chamber cover projects just a little above the wall-face for ready access to the fuses. The box can accommodate cable sizes up to 0·3 sq in. four-core p.i.l.c. and armoured. The fuse chamber contains three carriers provided with Henley hand-operated contacts for wedge type h.r.c. cartridge fuses; there is also a neutral link. The rising conductors emerge at the top of the box through insulating sealing glands.



Diagrammatic representation of rising mains in multi-storey building

(1) Incoming main cable, (2) earthing conductor to cable armour, (3) ironclad service fuse box, (4) ventilating louvre, (5) fire baffle-plate with cleats for conductors and earthing wire, (6) inspection boxes, 9 by 3 by 3 in., for 2 in. sub-service conduit, (7) twelve-way 60-A distribution box

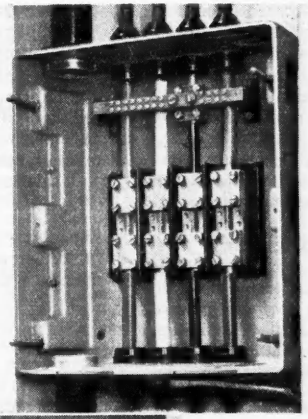
Consumers' individual lateral services to each of the flats on a floor of the building radiate from distribution boxes of up to 12 ways, each way having a h.r.c. fuse for up to 60 A. These boxes are 13½ in. wide by 14⅝ in. high by 6 in. deep, installed within a chase with the cover very nearly flush with the wall surface. Sub-circuits can accommodate up to 0·04 sq in. cable and the connections of the line busbars of the box to the mains can be selected so that sub-services can be grouped as required to secure load-balance. Subsequent adjustments to the phase groupings can be made if desired; it is estimated that this might be done during a 15-min. shut-down.

The rising mains enter and leave through insulating glands and the 2-in. conduit for the v.i.r. sub-services, situated at the top and bottom of the box, is secured by nuts which also provide bonds for the conduit. The busbar fittings clamp round the rising conductor.

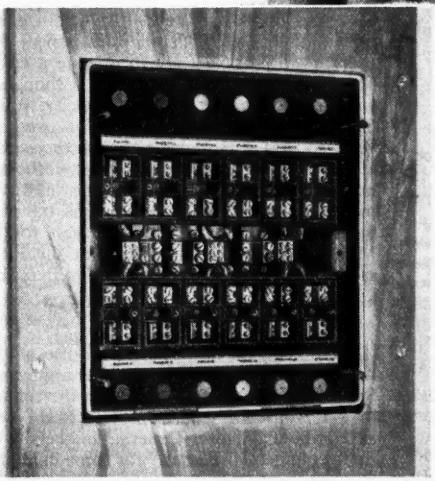
The erection of the box is simple. The only tools required, once the casing has been secured in the chase by screws into wall plugs, are a screwdriver, pliers and a knife. Each sub-service has an identification label and a phase identity disc. The neutrals of the services are accessibly connected to a neutral busbar in the box.

The two 9 by 3 by 3-in. conduit inspection boxes are arranged in the 2-in. conduit outlets to facilitate running the lateral sub-services, for which some undertakings use 7/16 s.w.g. cable. The conduit size can be reduced as the various services are "teed" off to consumers' terminals.

The covering of the mains chase can be hardwood or metallic lids or reinforced plaster. Pressed steel ventilating louvres fixed at intervals in the covers are designed with due consideration for safety. The fire baffles are cast-iron plates grouted into the sides of the chase at floor level. On their top side they carry an insulated multiple cleat of the same pattern as those which secure the mains normally. A 2-in. hole with a blanking plate provided on either side of the baffles allows for the passage of conduit.



Twelve-way 60-A distribution box without lid and fuses, showing (right) earthing connections during installation



The earthing system has been carefully designed to ensure durability and a high conductivity which will effectively prevent dangerous potential rises. It complies with Reg. 403 of the I.E.E. Regulations. For bonding and earthing at the main intake of a rising main there is a short spur of ⅜-in. dia. copper conductor sweated into a socket, which is bolted to the intake service box casting. The earthing conductor, which is at the right-hand side of the chase, is connected to the spur by a line-tap, the latter not being visible in the illustration. The rising earthing conductor is secured to the floor baffle plates by cleats and the connections for earthing the distribution boxes are similar to those for the main intake service. A 0·05-sq in. earthing conductor is used for a 0·1-sq in. mains system.

Electrical Legislation

EARLIER this year the London and Home Counties J.E.A. published "The Electricity Supply Statutes as Adapted and Modified by the Electricity Act, 1947," compiled by its general manager and chief engineer, Mr. Norman Elliott, O.B.E., Barrister-at-Law. The index to this volume covered only the contents, namely the Electricity (Supply) Acts, 1882 to 1936, and now the Authority has published a further index which, while embracing the original one, also contains references to the 1947 Act, the Statutory Rules and Orders made thereunder, and the Electricity Supply Regulations. Copies can be obtained from the Authority at 5-6, Lancaster Place, Strand, W.C.2, at 5s. each and the printers, the Solicitors' Law Stationery Society, Ltd., Flaxman Terrace, Duke's Road, W.C.I, are prepared to undertake the binding of the original summary and other documents and the new index in one volume.

Views on the News

Reflections on Current Topics

A SCORE of years ago the Central Electricity Board, as a newcomer to the electricity supply field, was not welcomed everywhere. Now it has come to be regarded as a more than acceptable leading member of the electrical family, whose passing would be keenly regretted but for the transference of a large number of its staff to the British Electricity Authority, if I may judge by the views I heard expressed at the dinner held by the A.M.E.E. last week in honour of Mr. Harold Hobson, the former chairman of the Board.

The task which was imposed on the Board was not made easier by defects in the Act of 1926, but those who had conducted negotiations (somewhat delicate in consequence) with the guest of the evening seemed most to admire the bracing forthrightness of his penetrating analyses of unsuspected flaws in their own arguments and to look forward to his early return to electrical activities. The response of the staff of the C.E.B. to good leadership has, it seems, been contagious in encouraging a consciousness of corporate endeavour towards a great end in an industry that is built up of geographically separated units. That is the heritage of the new organization which augurs well for its success.

* * *

Happening to be in the neighbourhood of the Ministry of Fuel and Power offices, Millbank, Westminster, I called in to see the Electricity Area maps which are now open to inspection. I consider that they are totally inadequate for the purpose. They are ordinary one-inch Ordnance maps upon which red borders have been superimposed. In some of them, particularly the London map, the district names cannot be distinguished without a reading glass and no indication is given of which undertakings are included in the areas, which is presumably what most people will want to know. I found no list to aid me in this respect.

* * *

Last week the *Electrical Review* reported that the Skipton U.D.C. had informed local electricians that no further electrical apparatus could be connected up without its consent which would be given only in urgent cases. While I fully appreciate this laudable attempt to keep consumption down, I am very doubtful whether the Council is on firm ground. Presumably as a means of ensuring that services are not overloaded, consumers are legally required to state their maximum requirement before being connected. So long as they do not exceed this figure and do not endanger the supply to others they can use what apparatus they like. They can also call for a greater supply at one month's notice. So far as I can see the only limit is that imposed by the building licensing arrangements under which the cost of installation work may not exceed £10 in a period, save under licence.

* * *

Some time ago a garage proprietor was fined for using a car battery for the purpose of lighting a showroom window. Absurd as it appeared, this prosecution under the Control of Fuel Order, 1942, was possibly justified for the battery might have been charged from the public mains. I doubt, however, whether there was any justification for another prosecution under the Order at Stoke-on-Trent last week. In this case a firm was charged with an infringement for using a 4½-V dry battery to operate a small non-illuminated revolving sign at a shop. It was stated that one unit of electricity would operate the sign continuously for over six years so that it must have been a very small affair. I am pleased to see that, although he had to agree that electricity was used, the magistrate dismissed the summons on payment of 4s. costs. I would suggest to the Ministry of Fuel and Power that there are more important matters to attend to than this kind of thing.

* * *

Having expressed views on the use of the dreadful word " priority," I rather appreciate Sir William Darling's remarks on the subject in the House of Commons last week. He asked the Paymaster-General, on behalf of the " commercial classes," for some guidance upon the respective standards of the priorities. He said he had seen all kinds—" top priority, high priority, P.M.L. priority, first priority, deferred priority and selective priority." The best of these must surely be " deferred priority."

—REFLECTOR.

Electricity in Building

Labour- and Time-Saving Devices at the Olympia Exhibition

BY far the greater proportion of electrical appliances displayed at the Building Exhibition now being held at Olympia, London, are for use in the preliminary and constructional work: there is very little apparatus for installation in the completed buildings. There is a profusion of power-operated units for grinding, cutting, polishing, grooving, drilling, etc., all types of building materials, including brick, concrete, stone, glass and plastics. Electrically operated vibrators are now employed not only for sieving operations but also for the vibration of concrete work to give greater density, less water content and quicker stripping time. Interesting items among metal-working tools are power bar benders, tube cleaners, and descaling and rust removal equipment.

Wood-working equipment is well represented by guillotines, saw benches, band saws, planers, shapers, moulders, sanders, rounters, jointers, morticers, borers, tenoners, veneer presses and glue mixers. Apart from sanders specially designed for floor surfacing there are floor scrubbers, squeegees, polishers and electrically heated floor polish sprayers. For large-scale paint mixing there are millers, mixers, refiners and finishers.

Portable Electric Tools

As indicated by the British Electrical Development Association, the Ministry of Labour and National Service and by individual exhibitors, the builder of to-day has at his disposal for work on site an extremely comprehensive range of portable electrically operated appliances. Screwdrivers, hammers, drills, shears, grinders, saw benches, hoists, winches, and paint and distemper spraying plant are only a few of the time and labour saving devices he can utilize. For this reason emphasis is laid on the great importance of ensuring that electricity supplies are available on site at the very commencement of building operations. More often than not arrangements can be made for a public supply but if this is not possible the provision of a small portable generator is a worth-while investment that will soon pay for itself.

On the subject of electrical installation work the Ministry of Labour also has a very instructive display demonstrating the various safety devices which may be employed to comply with the regulations under the Factories Act. Two other installation exhibits are also of especial note, the Flexible Non-metallic Conduits " Gilflex " wiring system employing tough p.v.c. conduits and Richard Crittall & Co.'s "Channel Conduit" system which is extremely simple to install and facilitates modification later. The latest Rawlplug and Philplug fixing devices find many applications in installation work.

Kitchen planning and built-in equipment come in for a good deal of attention and E.D.A. has a series of panels dealing with this subject as well as with some of the latest installation practices such as the use of the ring-main system, under-floor ducts and all-purpose sockets; the most economical and efficient methods of water heating; and the less well-known means of electric space heating, by convectors, panels, tubular heaters and oil-filled radiators.

Heating Equipment

These forms of heating appliances are also the ones principally covered by the individual manufacturers' exhibits. " Dulrae," " Medrae " and "Hirae" low, medium and high temperature panel radiant warming systems are demonstrated on Richard Crittall & Co.'s stand among various heating, ventilating and air-conditioning systems. The " Thermozon " convector is shown by Utilities (London), who also make the " Utilair " fluorescent lighting fittings, and two types of oil-filled radiator are to be found among the displays of Cunliffe-Owen Aircraft and Hurseal, Ltd.

A combination coal fire, electric fire, fireguard and firescreen is a novelty of the " Riva " Fireplace Co., each panel being operated separately after the fashion of a theatre safety curtain. Unit electric fan heaters are shown by Copperad and there is a good selection of the latest range of Vent-Axia extract and intake fans.

The advantages of a modern electric water heating system employing a " Twin " dual purpose heater installation is the theme of the British National Electrics stand, a sectionalized " house interior " showing floor by floor the very simple plumbing and electrical connections necessary. Other B.N.E. " Charlton " electric storage heaters are also exhibited. In addition to examples from its range of " U.D.B." (under-draining-board) water heaters Aidas Electric makes a special feature of its " Coal-Electric Sadia " system and the " Circoil " waste heat utilizer.

Electrolux is the sole exhibitor of refrigerators, while the only two washers are the Bendix and Hotpoint. The Staines Kitchen Equipment Co. shows a crockery washer. Many forms of time-keeping equipment ranging from master clock systems and slave clocks for the office and factory to time recorders, process timers, strike and chime mechanisms for church or public towers are included in the display of English Clock systems. Loudspeaking intercommunication telephones are shown by the Fleming Corporation of Great Britain.

The show closes on December 4th.

NEW BOOKS

Servo System Theory. Electrical Fire Precautions.

Servo Mechanism Fundamentals. By Lauer, Lesnick & Matson. Pp. 277; figs. and index. McGraw Hill Publishing Co., Ltd., Aldwych House, London, W.C.2. Price 17s. 6d.

This short textbook has been written from the viewpoint of the engineer engaged upon the design of low power remote-position-control servo-mechanisms; it would appear that the authors' experience has been limited to this class of servo-system. The introduction to the theory of closed-loop controllers is carefully made by the aid of mechanical analogies. Subsequent chapters deal with servo-systems having viscous damping, stabilization by time derivatives of error and control action dependent upon time integral of error; in each case the subject is introduced by a mechanical analogy helpful to the newcomer to the subject.

As indicated in the preface, the study of servo-mechanisms is necessarily a study in transient analysis and the authors have made the correct approach in that much of the book is devoted to analytical work. Ordinary differential equations have been used with the classical methods of solution; whether this is desirable is a matter of some controversy. It is true that the majority of practising engineers are likely to be better acquainted with this method than that of the operational calculus. But servo theory is an excellent vehicle for the teaching of operational methods which are so valuable in the examination of transient phenomena. Also the scope of the book has been limited partly because of the mathematical method; the majority of the systems analysed lead to second order differential equations and third order systems are but lightly touched upon. This is somewhat misleading because the majority of remote-position-control servos of, say, 1 h.p. and above lead to differential equations of the third order and upwards.

Simple resistance-condenser networks which can be inserted in the system to give approximations to first differential and integral of error are described and simplified methods of designing these networks are explained. Unfortunately the methods are over-simplified in that the authors have ignored time-lags in response of machines, etc., which commonly exist in control systems of this type. A book of 274 pages on position control servo-mechanisms should devote some space to the serious problems relating to backlash between the output end drive motor and other elements of the system; the omission is no doubt the outcome of the authors' preoccupation with very low power drives.

The book will be useful to the student and young engineer who feels himself unable to use operational methods and who is primarily interested in servos up to a few hundred watts output. For the engineer engaged upon larger power systems, or the industrial process control engineer, it tends to be misleading and would have to be supplemented by very substantial other guidance.—A.L.W.

Electricity and Fire Risk. By E. S. Hodges. Pp. 285; index. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 15s.

This is the second edition of a work first published in 1934, which has been brought up to date, reference being made to recent papers and research work on intrinsically safe apparatus and flameproof equipment. One or two important specifications, etc., have been published since the manuscript was completed and the statement that "there is no British Standard Specification for intrinsically safe circuits" is no longer true, and the author is undoubtedly at fault when he concludes that intrinsically safe equipment will have little application in industry. To-day, however, any work on a "live" subject is liable to be slightly out of date by the time it is published.

Apart from a few small criticisms of this nature the book is well written and informative and, although written primarily for persons concerned with fire insurance and fire assessors rather than technically trained engineers, it should be invaluable to all engineers concerned with electrical installation work. The installation engineer should be able to interpret the general descriptions in terms of quantitative data such as the necessary relation between earthing resistances and the settings of relays or the rating of fuses.—W.F.C.

Manual of Hire-Purchase Law. By A. C. Crane (solicitor) assisted by A. C. Crane, Jun., B.A. (Oxon.) Pp. 74. Trader Publishing Co., Ltd., distributed by Iliffe & Sons, Ltd., Dorset House, Stamford Street, S.E.1. Price 5s.

This work was first published before the war as "The Hire-Purchase Act, 1938: Its Meaning and Effect." It is divided into two parts, the first of which deals in a practical way with general legal points affecting all hire-purchase transactions, whatever the value of the goods. The second part is devoted to the 1938 Act which is interpreted clause by clause. A great deal of "case law" has been introduced by the authors.—J.H.C.

Books Received

The Welding of Plastics. By G. Haim and H. P. Zade. Pp. 206; figs. 88; index. Crosby, Lockwood & Son, Ltd., 20, Tudor Street, London, E.C.4. Price 21s.

Training Electrical Engineers

Discussion of Joint Committee's Report

LAST week's meeting of the Institution of Electrical Engineers was devoted to discussion of the report on "The Practical Training of Professional Electrical Engineers" (I.E.E. Journal, Part I, October, 1947), which was prepared by a committee appointed by the Institution jointly with B.E.A.M.A. and the Radio Industry Council.

SIR ARTHUR FLEMING, chairman of the Committee, explained that the report recommended that apprenticeship should be available for two broad types, graduates and students. For the former, training in works should be for two years, which need not be continuous; the student proceeding to a university might well undertake a year's training beforehand. Students, entering industry with the background of a good secondary school education, should spend four years in practical training. A considerable part of the training should be devoted to basic mechanical engineering and an almost equal amount to basic electrical engineering. There should be no specialization during the period of practical training.

Acquisition of Experience

The undergraduate should use the long vacations to gain experience either with a variety of concerns, in a power station, as a supernumerary engineer on board ship or in foreign travel. For those obtaining their technical knowledge by part-time study the Committee recommended day release. The report also recommended the formation of apprentice associations, run by the apprentices themselves, to provide for lectures, sport and other activities which would bring men together. A large works, with men from all over the world, provided all the essentials of a great university.

Information such as was given in the report should be of value to students coming from overseas. They should also be given the best training possible. because they would go back to their own countries as missionaries.

MR. J. A. SUMNER (Norwich Electricity Department) said that it was a very serious blot on the electricity supply industry that during the last fifty years only one or two undertakings had formulated a proper scheme of training. The report had been well timed, since it coincided with the inception of the British Electricity Authority. It was to be hoped that that Authority would adopt, for the first time, a national scheme of training for electricity supply. The report suggested that student apprentices who took part-time technical courses should take the Higher National Certificate rather than a degree. Personally, he thought that the man who took an engineering degree while doing his part-time training was better equipped than one who did four years at a university. His own undertaking reckoned to turn out one degree man a year.

MR. F. BRAY (Ministry of Education), while congratulating the Institution on the report, said that the Ministry felt that there was a slight tendency to look through the eyes of the large firm. It spoke of the wider experience necessary for the apprentice with a small firm, but how was that to be obtained? Many students at technical colleges had no objective beyond getting the National Certificate and were content to leave their practical training to their firm. Possibly the Regional Councils set up by the Ministry could interest themselves in the matter, or the local professional branches might be able to take steps with the firms concerned and make the necessary arrangements for the wider training of the brighter candidates. Compulsory evening education might be necessary at the moment, but he hoped that an effort would be made all over the country to get two days' release a week if necessary.

MR. L. E. BALL (University of London Appointments Board) described the report as invaluable. At present, he said, there was a strong tendency for the university-trained engineer to bypass the normal works training and go straight into a specialist appointment, since the demand exceeded the supply. Most professors of engineering did their best to counteract that and the support given to them by the report would be very helpful.

Engineers and Technicians

MR. D. P. SAYERS (Birmingham Electricity Supply Department) said he found great difficulty in applying the definitions of "professional engineer" and "technician" given in the report to the supply side of the industry. Taken literally, the definitions given would mean that a shift engineer in direct operational charge of a modern power station would be only a technician, while a young university graduate employed on design work might claim to be a professional engineer. A supply undertaking was not a suitable organization for the fundamental training of engineers, but unless some of the larger undertakings provided training facilities there was likely to be a serious shortage in future. Generation and distribution were becoming almost separate professions and the distinction was likely to be accentuated under nationalization. He hoped that the new authorities would afford facilities for students to be trained in both sections. Some guidance on whetner it was better to take the technical training before or after national service would be of value.

MR. E. M. HICKIN (chairman, I.E.E. London Students' Section) emphasized the importance of providing hostels for students, particularly to secure seclusion for evening studies. The Students' Sections of the Institution might play a part alongside the apprentice associations. Some management training would be of value.

MR. VAN GRUTTEN (University of Cambridge Appointments Bureau) and MR. E. A. BAYLEY (Manchester University Appointments Board) stressed the great value of the report to them in their work. MR. H. G. TRELOAR (B.I. Callender's Cables) endorsed the suggestion of transferring boys from trade to student apprenticeship in suitable cases and the interchange of apprentices between one firm and another.

Design Background

MR. R. W. L. HARRIS (Professional Engineers' Appointments Bureau) welcomed the provision for a period in the drawing office as part of the practical training. He was continually finding that employers turned down engineers with good practical training and academic qualifications because they lacked a design background.

MR. D. I. LAWSON (Pye, Ltd.) said his firm was so impressed by the report that it had reorganized its own apprenticeship scheme to come into line with it. The student should be encouraged to join his professional institution and be allowed to visit other companies to enable him to meet other engineers.

MR. G. A. TAYLOR favoured six years' apprenticeship rather than four. He hoped that the Ministry of Education would consider the possibility of having some organized scheme between industry and the teaching profession, so that teachers during vacations could take courses of training in industry. He also hoped that the Committee would give a lead to industry by discouraging overtime for apprentices.

MR. V. B. TWISS (Henley's) said that the fundamental principles of the report were applicable to the specialized side of industry with which he was concerned. He had some misgivings, however, as to the educational requirements stipulated for the student apprentice, which should not be so interpreted as to exclude boys from the junior technical schools.

COMMANDER J. C. TURNBULL, R.N., emphasized the need for apprentices to get to know the workpeople really well and strongly condemned any tendency to regard apprentices as a form of cheap labour. MR. FREEMAN (West Ham Technical College) said that some employers withdrew their students from part-time day release on reaching the age of eighteen, but it was important that they should be allowed to complete their course by part-time day study.

MR. F. E. ROWLAND (G.E.C.) pointed out that the report made no reference to sales engineers who through part-time study had passed the Higher National Certificate or the Institution examination. Could the practical experience which they acquired in their work be accepted in lieu of practical training in a factory? There might be, he suggested, greater recognition of the ordinary National Certificate examination and the associate grade in the Institution, a combination of which should be acceptable in administrative posts for which the high technical standards of a professional engineer were not essential.

SIR ARTHUR FLEMING, replying to the discussion, pointed out that the Committee did not regard the technician as a secondary rating and the fact that a man was in the technician grade was not to his detriment. Several of the other members of the Committee commented on the discussion. MR. S. E. GOODALL said that it was impossible for the part-time man to get the full benefit, which meant the residential benefit, of a university education; very few student apprentices could stay the arduous course necessary to take an external degree. MR. D. B. HOSEASON, dealing with the same point, mentioned that about half the corporate members of the Institution reached that status by part-time education and about half by a university course.

Railway Statistics

FROM the Railway Clearing House (203, Eversholt Street, London, N.W.1) we have received a copy of "Tables of Statistical Returns Relating to the Railways of Great Britain, Years 1938 to 1946" (2s.). This comprises details for each main-line company and the London Passenger Transport Board of rolling stock, permanent way, passenger and goods traffic, etc., with summary tables for the whole of the systems.

It is shown that in 1946 there were 2,263 electric passenger-carrying rail motor coaches (against 1,986 in 1938) of which 1,613 were owned by the Southern Railway (1,511 in 1938), 295 (against 104) by the L.N.E.R., and 252 (against 268) by the L.M.S. Other electric rail motor vehicles numbered three (against five in 1938). In the coaching vehicle class electric stock is shown at 2,242 (2,133 in 1938), the Southern Railway accounting for 1,566 (1,521).

The statistics of electrical working show that in 1946 the total for passenger trains was 73·3 million train-miles (as compared with 79·9 million in 1938). Of this total the Southern Railway accounted for 34·9 million (against 37·4 million) and the London Passenger Transport Board for 27·2 million (31·8 million). As regards freight trains, electric working accounted for 111,920 train-miles (against 3,461 in 1938), the Southern Railway being responsible for 104,792 (against nil).

Power consumption during 1946 totalled 1,283 million kWh (1,179 million in 1938) of which the Southern used 546 million and the L.T.P.B. 543 million.

Small-Motor Standards

Revised Basis in United States

By A. N. D. Kerr, A.M.I.E.E.

IN addition to complying with the American Standard "Rotating Electrical Machinery," small-power motors in the United States are required to conform to standards laid down by the National Electrical Manufacturers' Association (N.E.M.A.). Recently N.E.M.A. evolved a standardization plan for fractional-horse-power single-phase motors which will increase their life by providing a consistent method of designating their rating. A summary of its salient features may interest those who are considering the desirability of revising our own standards.

The basis of the plan is to define motor output in terms of breakdown torque, and to indicate by means of a service factor the maximum continuous output safely permissible within the limits of a reasonable temperature rise. The figures chosen are based on the wide experience of leading American motor makers extending over many fields of application. As a result, general-purpose small-power motors rated on the new basis cater adequately for all normal requirements. This leaves only special requirements for which in any case special designs would be necessary.

Breakdown Torque

For the purpose of defining horse-power rating the value of breakdown torque must fall within a specified range. The table below gives typical values for 50-cycle 4-pole motors in ounces-feet at an approximate full-load speed of 1,425 r.p.m., including for comparison figures the normal full-load torque and breakdown values expressed as a percentage of full-load values. The range includes the higher figure down to, but not including, the lower figure.

H.P.	*Torque in oz-ft.*		*Breakdown torque as percentage of F.L.T.*
	Full Load	*Breakdown*	
$\frac{1}{8}$	7·37	13·8–19·8	188–269
$\frac{1}{6}$	9·82	19·8–25·8	202–261
$\frac{1}{4}$	14·73	25·8–37·8	175–257
$\frac{1}{3}$	19·64	37·8–48·5	193–247
$\frac{1}{2}$	29·47	48·5–69·5	165–236
$\frac{3}{4}$	44·21	69·5–99·0	157–224

For any design the minimum figure obtained on test will determine the appropriate horse-power rating. If a group of motors had an average breakdown torque of 26 oz-ft but one of them developed only 25 oz-ft, then the group would be rated $\frac{1}{8}$ h.p., since 25 oz-ft falls within the $\frac{1}{8}$ h.p. range of breakdown torques. On the other hand, if group average gave 37·7 oz-ft, with a minimum value of 35 oz-ft, then the group would be rated $\frac{1}{4}$ h.p., since both values fall within the $\frac{1}{4}$ h.p. range. High breakdown torques will up-rate horse-power, e.g., if in a group of $\frac{1}{3}$-h.p. motors the minimum breakdown torque is 250 per cent then the motors would be rated $\frac{1}{2}$ h.p.

This plan, therefore, provides values of breakdown torque adequate to the load demands corresponding to the nominal h.p. developed.

Temperature Rise and Service Factor

All open-type general-purpose motors have a maximum temperature rise of 40 deg C under normal service conditions. These are defined as ambient air temperature not exceeding 40 deg C (104 deg F) and height above sea level not exceeding 3,300 ft. An American open enclosure corresponds approximately to the British protected pattern. These small-power motors are designed to develop, in addition, a higher output with a temperature rise of 50 deg C, at which maximum efficiency is normally obtainable. The actual increased output is given by means of a service factor stamped on the motor nameplate. This is a number by which the normal rating should be multiplied to determine the maximum safe motor load. A table of such factors is given below:

H.P.	..	..	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{3}{4}$
Service factor	..	..	1·4	1·35	1·35	1·35	1·25	1·25

These figures were obtained by determining the overload which produced a 50 deg C rise on motors whose normal rise was assumed to be 40 deg C. Often the actual rise was lower than that figure, so that even at the increased rating not all the thermal capacity of the motor was utilized and even higher outputs would be practicable under favourable conditions.

These service factors are intended to be used only under normal service conditions, as defined above, and when the motor is operating on the voltage and frequency for

which it was designed. Hence an American standard ½ h.p. motor will develop 0·45 h.p. continuously when running on rated voltage and frequency in air temperatures up to 104 deg F (which includes most temperate climates). The temperature rise will, however, increase from 40 deg C (or less) at normal output to not more than 50 deg C on continuous maximum rating.

From this the advantage will be seen of designing motors for a 40 deg C rise so as to have available at a higher, but safe, figure a margin of power adequate to overload conditions which may be encountered in service. Such a margin also covers operation at normal output on a reduced voltage (now more usual on electricity supplies generally).

Starting Current

The N.E.M.A. plan lays down maximum values of starting current, the figures being taken with the rotor locked. These values are given below for 230-V motors, irrespective of frequency.

H.P.	⅛ or less	¼	⅓	½	¾
Locked amperes	10	11·5	15·5	22·5	30·5

The increasing tendency is thus recognized of supply undertakings to limit the application of motors on the basis of starting current rather than of h.p. As there is a definite relationship between breakdown torque and locked rotor current, reasonable values of the former permit adequate figures for starting currents. These encourage the use of standard single-phase motors—both high-starting-current designs such as split-phase and capacitor-start and low-starting-current designs such as the various repulsion and repulsion-induction motors. They discourage the use of motors which rely for their high values of starting torque on abnormally high values of starting current. American practice is to limit split-phase motors to light duties demanding infrequent starting against approximately full-load torque. For heavier duties capacitor-start motors are used, whilst for heavy-inertia drives or where prolonged starting conditions are involved repulsion-induction motors are recommended.

Code Letters

Finally, the plan extends the use of the letters already standardized by the National Electrical Code. These are marked on the motor name-plate to show input in kVA per h.p. with the rotor locked, which enables the branch-circuit protective devices to be correctly adjusted. Typical values showing the appropriate ratings for fuses and settings for circuit breakers (of the time limit type) are given below. The kVA given includes the lower figure up to, but not including, the higher figure.

Code letter	*Locked kVA per h.p.*	*Per cent of full-load current*	
		Fuse rating	*Breaker setting*
A	0–3·15	150	150
B–E	3·15–5	250	200
F–R	5 & higher	300	250

Such Code letters give a clear indication of the circuit protection recommended. It is possible too to calculate the maximum starting current required from the relationship. Starting amps =

$$\frac{\text{Locked kVA per h.p.} \times \text{rated h.p.} \times 1{,}000}{\text{Rated voltage}}$$

British Standard Ratings

As compared with motors built to these latest American standards, fractional-horsepower motors built strictly in accordance with British Standard 170: 1939 have a normal temperature rise of 50 deg C and so have no continuous overload capacity available without exceeding that figure. Also, their breakdown torque and starting current vary for different applications, there being no recognized standard covering these points.

It was presumably to meet some of these objections that an Amendment (No. 2) was recently issued giving, for refrigerating compressor duty, minimum starting and accelerating performance in terms of torque, and stipulating an excess torque capacity of 40 per cent for 30 min. This is equal to a service factor of 1·4 for half an hour, and compares unfavourably with American figures of 1·35 and 1·25 continuously.

If adequate margins to meet varying load conditions are desirable, as is evidently felt in the United States, then British motor makers should perhaps review their present standards to meet increasing American competition in overseas markets.

Bibliography

1. NEMA Section MG8—Revision Oct. 1, 1946.
2. "Electrical Engineering," April 1947, pp. 337–339.
3. National Electrical Code 1947. Clause 94304 and Table 26.

"Cooking the Electric Way" is the title of an E.D.A. leaflet for the guidance of housewives new to electric cooking. The hints given are of particular use in these days of load shedding, some notes on cooking from cold being especially helpful.

PERSONAL and SOCIAL

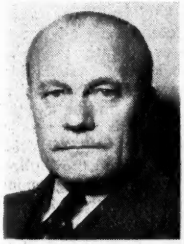
News of Men and Women of the Industry

ON November 20th **Mr. Harold Hobson** was entertained at a dinner by the Associated Municipal Electrical Engineers (Greater London Centre). The chair was taken by Mr. C. T. Melling, who observed that loyalty to the new regime, which was essential to the continued progress of public electricity supply, should not permit forgetfulness of the services of the former chairman of the Central Electricity Board.

Sir Harry Railing spoke of Mr. Hobson's broad vision and straight dealing: the results of his farsightedness would, he said, stand for long to come. His exceptional qualities must not be lost to the electrical industry. Mr. George Wansborough attributed the lion's share of the success of the grid to the commercial and technical acumen of the principal guest, referring to his ruthless integrity of mind and purpose in exposing errors. Tributes were paid to his underlying kindliness by Mr. F. Selley and to his broadminded attitude regarding the dues from war-damaged undertakings by Mr. J. Eccles, who also mentioned the generating plant programme he had drawn up in 1944, without which the position of electricity supply in the future would have been precarious.

Mr. Hobson recalled his twenty years' service with the C.E.B. and attributed the success achieved to the team spirit among its staff. He hoped before very long to renew his contacts with the electricity industry in an active capacity.

Mr. Evelyn Boys, secretary of the Northmet Power Co., is retiring at the end of this month. Apart from 1914-1918, Mr. Boys has been secretary to the company for over forty-one

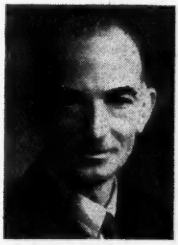


Mr. E. Boys

Mr. J. E. Blair

years. During this period he has also been secretary of a number of distribution companies, including the Hendon, Harrow and Bedfordshire, Cambridgeshire & Huntingdonshire Companies; also the London & Suburban Traction Co., and its subsidiary tramway companies, the Metropolitan Electric, the London United and the South Metropolitan. Mr. Boys has been a member of the Council of the Chartered Institute of Secretaries since 1933. **Mr. J. E. Blair,** F.L.A.A., has been appointed secretary and accountant to the Northmet Power Co. as from December 1st. He joined the company in 1914 and became accountant in 1929, and accountant and assistant secretary in 1940.

Mr. F. T. Cotton, B.Sc., has been appointed head of the Physical Laboratory of Ekco-Ensign Electric, Ltd., Southend - on - Sea. Mr. Cotton is well known for his work on valves, cathode - ray tubes and electronics, with which he has been actively associated for a number of years. He was formerly at the National Physical Laboratory.



Mr. F. T. Cotton

Mr. J. S. Hamilton, electrical and tramways rolling stock engineer with the Leeds Corporation, is retiring in February next after thirty-five years' service. He is the son of the late Mr. J. B. Hamilton, who was head of Leeds Transport Department from 1902 to 1925.

The Electricity Supply Joint Committee has elected **Mr. F. Newey,** M.I.E.E., of the Incorporated Municipal Electrical Association, as its chairman to succeed **Mr. W. N. C. Clinch,** and **Mr. W. R. T. Skinner,** B.Sc., A.M.I.Mech.E., A.M.I.E.E., of the Incorporated Association of Electric Power Companies, as its vice-chairman for the ensuing year.

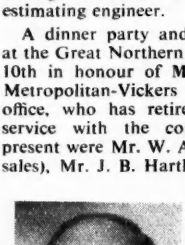
Siemens Electric Lamps & Supplies, Ltd., has appointed **Mr. W. G. Craig** as manager of its Newcastle branch in succession to the late Mr. F. H. Webb. **Mr. W. F. Griffiths** has been appointed manager of the company's Illuminating Engineering Department in London.

Mr. G. H. Walker has joined Ekco-Ensign Electric, Ltd., as an illuminating engineer. He is operating from the Preston sales office, Kent Street Works, Preston, Lancs.

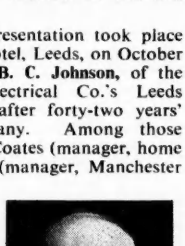
Dr. E. Mundel, B.Sc., has resigned his position as chief engineer to the Hopkinson Electric Co., Ltd., Cardiff, in order to take up an appointment at Leeds University; he is, however, being retained in a consulting capacity. **Mr. G. Redfern,** M.A., has been appointed chief engineer to the company with effect from December 1st. He was educated at Cambridge University, graduating with first-class honours in the Mechanical Science Tripos. Subsequently he was with the B.T.H. Co. and the Metropolitan-Vickers Electrical Co., Ltd., mainly

engaged in induction motor design and development. The Hopkinson Company has also appointed **Mr. E. Kenneth Day** as advertising manager and **Mr. E. J. Maturin** as assistant estimating engineer.

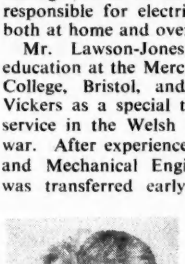
A dinner party and presentation took place at the Great Northern Hotel, Leeds, on October 10th in honour of **Mr. B. C. Johnson,** of the Metropolitan-Vickers Electrical Co.'s Leeds office, who has retired after forty-two years' service with the company. Among those present were Mr. W. A. Coates (manager, home sales), Mr. J. B. Hartley (manager, Manchester



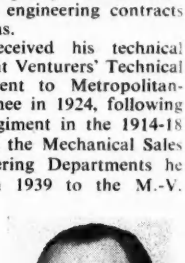
Mr. B. C. Johnson



Mr. J. Billington



Mr. G. T. King



Mr. H. Lawson-Jones

office), Mr. F. Gurney (manager, plant sales) and Mr. F. C. Tyrrell (Manchester office Lamp Department superintendent). Mr. Johnson joined the British Westinghouse Co. in 1905. For twelve years he was at Trafford Park, working in many different departments and at one time editing the "M.-V. Gazette." In 1917 he was transferred to Manchester office, and two years later went to Leeds. He was presented by his friends and colleagues in Leeds and Manchester with a Biro pen and a case of drawing instruments. Mr. Johnson has also received a case of tools, including chrome vanadium spanners and lathe chucks, from the staff of the Huddersfield Corporation Electricity Department. The M.-V. presentation was made by **Mr. R. P. Horlock** (manager, Sheffield office) to whom Mr. Johnson later presented a silver sweet dish, subscribed for by Leeds office staff to mark Mr. Horlock's promotion to the position of Sheffield office manager.

Mr. J. Billington, the Metropolitan-Vickers purchasing agent, will retire on December 31st, after forty-five years' service. He will be succeeded by the present contracts manager, **Mr. G. T. King,** and Mr. King's assistant, **Mr. H. Lawson-Jones,** M.C., B.Sc.(Eng.), will then become manager of the Contracts Department. Mr. Billington joined the British Westinghouse Co. in 1902 and some years later he became assistant to the purchasing agent, being appointed purchasing agent and storekeeper to the company in 1916. Since August, 1945, Mr. Billington has also been chairman of the A.E.I. Group Purchasing Committee.

Mr. King joined the Contracts Department in 1928, and in September, 1936, became manager, and in this capacity he has been responsible for electrical engineering contracts both at home and overseas.

Mr. Lawson-Jones received his technical education at the Merchant Venturers' Technical College, Bristol, and went to Metropolitan-Vickers as a special trainee in 1924, following service in the Welsh Regiment in the 1914-18 war. After experience in the Mechanical Sales and Mechanical Engineering Departments he was transferred early in 1939 to the M.-V. aircraft factory, where he acted as commercial manager until the return to peacetime conditions, when he became assistant manager of the Contracts Department.

Mr. F. W. Purse, M.I.E.E., M.I.Mech.E., presided at the opening session of the fourth Annual Building Congress held at Folkestone on November 18th and 19th, under the auspices of the Building Industries National Council of which he is president. Mr. Purse was formerly chief engineer of the London & Home Counties Joint Electricity Authority and is now acting as honorary director of the National Register of Electrical Installation Contractors.

Mr. T. A. E. Bowen, technical art adviser to Philips Electrical, Ltd., was recently elected a Fellow of the Royal Society of Arts. Mr. Bowen is also a member of the Society of Industrial Artists, and a Fellow of the Central Institute of Art and Design. He is a commercial artist with many years' experience in all fields of printing reproduction and joined the Philips' organization in 1940 as a designer-draughtsman when he was chiefly concerned with radio and X-ray development.

The Birkenhead Branch of Electrical Contractors' Association last week gave a complimentary luncheon and made a presentation to **Mr. F. W. Brecknell,** who until recently was borough electrical engineer.

Mr. P. G. Bhaget, B.Sc., A.M.Inst.C.E., M.I.E. (India), has taken over the post of Director-General of the India Store Department, which is at present located at Blackpool, from **Mr. W. F. West, C.I.E.**

Mr. R. A. Riddles, C.B.E., M.I.Mech.E., has accepted the invitation of the Council of the Junior Institution of Engineers to become president of the Institution for the 1947-48 session. **Mr. P. W. Dunn** has been elected chairman and **Messrs. G. W. Tookey,** A.C.G.I., and **S. J. Crispin,** L.R.I.B.A., M.I.Struct.E., have been elected vice-chairmen.

Mr. George Caton, M.I.E.E., has been appointed managing director of the Yorkshire Switchgear & Engineering Co., Ltd., in succession to the late Mr. W. H. Turner.

Mr. T. H. Hall, M.S.R.E., A.M.Brit.I.R.E., has been appointed secretary of the Society of Relay Engineers in succession to the late Major J. Russell Pickering, M.B.E. The offices of the Society have been transferred to 23, Dalkeith Place, Kettering (telephone: Kettering 3685).

Sir Campbell Stuart has retired from the board of A. C. Cossor, Ltd.

On November 15th the Social and Athletic Club of the Lancashire Dynamo & Crypto, Ltd., Trafford Park Works, held its annual dance at "The Manchester Limited" restaurant. Over 300 guests attended and during the evening the managing director, **Mr. H. W. Bosworth,** assisted by Mrs. Bosworth, presented fifty-six gold wristlet watches to members of the company who had completed twenty-five years' service or over.

The Johnson Matthey Amateur Dramatic Society is presenting its fourth post-war play "Love from a Stranger," by Frank Vosper on December 4th, 5th and 6th at King George's Hall, Adeline Place, W.C.1. Box office telephone number is Holborn 9277.

About four hundred wives and relatives of employees of W. T. Henley's Telegraph Works Co., Ltd., visited the cable and engineering factories at Northfleet on November 15th. It had been suggested that such a visit would not only be of general interest but would be a particular attraction to some of the younger generation who will in due course be seeking employment.

The Lancashire Electric Power Co.'s Amateur Dramatic Society excelled all their previous performances when they presented "Jacob's Ladder" by Norman MacOwan, at the Adult Education Institute, Manchester, on November 13th and 14th. Mr. A. Duff gave a very fine performance in the role of David Maxton, who was faced with the problem of how to provide for his wife and family in the three months the doctors gave him to live. Admirable support was given by the rest of the cast. After the final curtain, **Mr. S. M. Rix,** secretary and assistant manager of the Lancashire Electric Power Co. and chairman of the Society, said that the play had set a new standard for the Society and reflected great credit on the cast and those behind the scenes. A special word of thanks was also due to Mr. I. L. Thomas, the producer.

Obituary

Mr. A. S. Barnard.—We regret to learn of the death at Cirencester last week at the age of seventy-nine of Mr. Adam Sedgwick Barnard, who at the time of his retirement in 1936 was manager of the Chloride Electrical Storage Co.'s stationary and vehicle battery home sales department, Manchester. A native of Cheltenham, Mr. Barnard was educated privately and was apprenticed in 1886 to Sydney F. Walker & Olliver, Cardiff. In 1892 he was appointed borough electrical engineer of Lancaster and two years later took up a similar position at Hull. From 1902 to 1906 he served as electrical engineer to the Ceylon Government, returning to England to become borough electrical engineer of Walsall. He joined the Chloride Electrical Storage Co. in 1914. Mr. Barnard was a member of the Institution of Electrical Engineers and was chairman of the North Western Centre in 1922-23. He was also an associate member of the Institution of Civil Engineers.

Mr. T. Boswell.—The death on November 19th is reported of Mr. Terence Boswell who was in the Contracts Spares Department of the Metropolitan-Vickers Electrical Co., with whom he had been for nearly forty years. He was fifty-four years of age.

Mr. R. A. Hopkinson.—In his will, Mr. Robert Addy Hopkinson, former chairman and managing director of Hopkinsons, Ltd., whose death we reported last week, has left nearly the whole of his estate, said to be in the neighbourhood of £250,000, to the Labour Party "for the education of the people of this country in Socialist principles."

Wills.—Mr. A. Albrecht, director and secretary of the Electrical Wholesalers' Federation, and a former president, left £4,810 (net personalty £4,775).

Mr. H. Savage, formerly works manager of W. T. Henley's Telegraph Works Co.'s North Woolwich works, left £21,095 (net personalty £21,016).

Mr. H. F. Howells, director of Howells (Electric Motors), Ltd., Hanley, left £18,619 (net personalty £18,527).

Mr. J. Dalziel, M.I.E.E. late assistant to the chief mechanical engineer, L.M.S., and formerly assistant electrical engineer, left £13,139 (net personalty £13,042).

Mr. W. A. Macfarlane, a director of the Macfarlane Engineering Co., Ltd., left personal estate in England and Scotland valued at £6,966.

Mr. R. S. Wood-Plummer, district manager, Automatic Telephone & Electric Co., Ltd., Bristol, left £1,855, with net personalty £1,757.

Mr. R. Clay, electrical engineer, left £6,176 (net personalty £5,888).

Mr. L. T. Rowntree, electrical engineer, Fleetwood, left £3,869 (net personalty £3,636).

Mersey Centre Dinner

Review of I.E.E. Work

THE annual dinner of the Mersey and North Wales Centre of the I.E.E. was held at Liverpool on November 17th. MR. P. C. BARNES, M.A., who presided, mentioned that the Centre now had over a thousand members.

Replying to the toast of the Institution, proposed by LT. COL. R. SHIELDS (Liverpool Engineering Society), Mr. PERCY GOOD, President, I.E.E., said that nearly 90 per cent of the electrical engineers of the country and a large number of engineers practising in overseas countries, were now members of the Institution. Between the period before the war and now, membership had been nearly doubled and at present exceeded 31,000. Strong membership, however, was not the sole criterion of effectiveness; it must register on the quality of the service which engineers could give in the many industries which relied on electrical service. Between 55 and 60 technical committees had been set up by the I.E.E. and some were doing work of outstanding importance.

The I.E.E. recognized its responsibility for training electrical engineers. The three reports of the committee under the chairmanship of Sir Arthur Fleming, the last of them dealing with practical training, laid the foundation for future guidance, and would, he believed be accepted as an outstanding contribution to the educational programme of civilized countries.

After a reference to the Institution's share in the preparation of regulations and Codes of Practice, Mr. Good said that there was no use for fuel, power and light, industrial or domestic, which could not be better done electrically. It was perhaps " anti-social " to talk about adding to the electrical load, but this was merely a passing phase. The task of the future would be to make available to the community all the benefits that electricity services could create.

The toast of the guests was proposed by MR. J. O. KNOWLES, M.A., and the Lord Mayor of Liverpool (ALD. W. T. LANCASHIRE) replied.

Electricity in Madras

Government Department's Report

DURING the period covered by the latest report of the Government of Madras Electricity Department (1945-46) the Machkund hydro-electric scheme was sanctioned. This had been the subject of protracted negotiations between Madras and Orissa on the boundary question and the sharing of power. The project is capable of an ultimate development of 100,000 kW of which the first stage (some 34,000 kW) should be ready by 1950. It will serve the needs of the Vizagapatam, East and West Godavari, Kistna and Guntur districts south to Ongole, the existing steam stations at Vizagapatam and Bezwada being retained as standby. The report of the chief engineer (electricity), Sri G. Sundaram, comments that the scheme should inaugurate an era of rapid industrial and agricultural advance in the Andhra area, which possesses all prerequisites of prosperity except, at the moment, cheap power.

Other major schemes sanctioned included the Moyar hydro-electric development (estimated cost Rs 268 lakhs in five years), extensions to the Basin Bridge generating station, Madras (Rs 244·17 lakhs in ten years) and extensions to the Vizagapatam station (Rs 27 lakhs in five years). The 1946-47 programme has also included extensions at Pykara and Papanasam, and the formation of an electricity system for the ceded districts.

The year was marked by phenomenally adverse water conditions at Mettur, where the power-house had to be closed down for two weeks, the water in the reservoir reaching the lowest level on record. Relief was, however, given by Pykara and there was no serious dislocation.

The aggregate demands on the Government power systems amounted to 60,870 kW and 327·3 million kWh was generated, these figures comparing with 58,125 kW and 301·1 million kWh in the preceding year. Additional loads were confined to essential needs. In the Province as a whole a total of 413·9 million kWh was generated.

South African News

From Our Cape Town Correspondent

A DEVELOPMENT of electrical interest in connection with the new Odendaalsrust goldfield is the announcement of a coal-power project for the Vierfontein area a few miles below the Vaal River and within twenty miles of Klerksdorp. The Electricity Supply Commission recently stated that the Vaal generating station would be used to supply the initial power required for the mines in the Odendaalsrust area, but that a new power station would probably be required by the time the mines reached production stage and that the question of a suitable site was being investigated. With its abundance of coal, though not of high grade, the Vierfontein site is well recommended, particularly with the advantage of the water resources of the Vaal River within a few miles. A new company, Vierfontein Coal Holdings, Ltd., has been formed. Both the coal mine and the power station are long-term projects.

HIRE-PURCHASE APPLIANCES.—The Cape Town City Council's new hire-purchase scheme has now been put into operation and is proving very popular. It differs from the old scheme, discontinued in 1942, mainly in that a deposit of 10 per cent of the purchase price is required; formerly the first ordinary instalment constituted the deposit. Any appliance bought

under the scheme will be serviced free by the Electricity Department throughout the period of payment, which may be spread over three years. It is estimated that there are now available several hundred refrigerators and a smaller number of ranges. There are fairly good supplies of washing machines and it is expected that there will be little difficulty in meeting applications for water heaters. The biggest demand so far has been for washing machines and refrigerators. Electric ranges can still only be sold under permits issued by the Controller of Building Materials.

RAILWAY ELECTRIFICATION.—The electrification of the railway line from Cape Town to Somerset West and the Stellenbosch loop line has been planned by the railways administration to take place in advance of the main line electrification to Touws River and possibly to Beaufort West. An early conversion is also expected of the Cape Town suburban line from 1,500 to 3,000 V. The main line electrification will take its supply from a new power station to be erected at Worcester, but the earlier projects will rely for power on the existing pooled stations at Cape Town. Towards the end of last year the railways administration expressed the hope that the Somerset West and Stellenbosch electrification schemes would be completed in 1949. The city electrical engineer of Cape Town recently stated that the deciding factor would be the completion of the Table Bay power station, which was not expected before 1950 or 1951.

Electricity Areas

Maps Open to Inspection

IN an appendix to the original version of the Electricity Bill, 1947, the fourteen Electricity Areas were broadly defined. Now the Ministry of Fuel and Power has prepared maps showing the proposed actual areas. These may be inspected at the Ministry, 7, Millbank, S.W.1, between the hours of 10 a.m. to 12 noon from Monday to Saturday and from 2 to 4 p.m. on Monday to Friday. Copies may also be seen at the following addresses in the fourteen areas during the same hours:—

London—Ministry of Fuel and Power, 7, Millbank, S.W.1.

South Eastern—Regional Coal Office, Ministry of Fuel and Power, Oakfield Court, Grovehill Road, Tunbridge Wells.

Southern—Regional Office, Ministry of Fuel and Power, Whiteknights, Earley, Reading.

South Western—Regional Office, Ministry of Fuel and Power, 12–14, Apsley Road, Clifton, Bristol, 8.

Eastern—Regional Office, Ministry of Fuel and Power, Shaftesbury Road, Brooklands Avenue, Cambridge.

East Midlands—Regional Office, Ministry of Fuel and Power, Castle Gate House, Castle Gate, Nottingham.

Midlands—Regional Office, Ministry of Fuel and Power, 63, Hagley Road West, Birmingham, 17.

South Wales—Regional Office, Ministry of Fuel and Power, 27, Newport Road, Cardiff.

Merseyside and North Wales—Town Clerk's Office, Municipal Buildings, Liverpool, 2.

Yorkshire—Regional Office, Ministry of Fuel and Power, Century House, South Parade, Leeds 1.

North Eastern—Regional Office, Ministry of Fuel and Power, Government Buildings, Ponteland Road, Newcastle-on-Tyne 5.

North Western—Regional Office, Ministry of Fuel and Power, Burton Road, West Didsbury, Manchester 20.

South East Scotland—Regional Office, Ministry of Fuel and Power, 51, Cockburn Street, Edinburgh 1.

South West Scotland—Sub-Regional Office, Ministry of Fuel and Power, 145, St. Vincent Street, Glasgow, C2.

The Royal Wedding

Electrical Industry's Gifts

Among the many electrical gifts sent to Princess Elizabeth on the occasion of her wedding was a selection of electrical appliances from the British Electrical & Allied Manufacturers' Association, including a plate warmer, toaster, kettle, coffee percolator, clock, and electric fire. Among the larger appliances are an electric

Some of the electrical wedding gifts presented to Princess Elizabeth by B.E.A.M.A.

cooker, floor polisher, washing machine and a water heater. These were accompanied by an illuminated address offering greetings and good wishes. The Electrical Association for Women sent the Princess an electric blanket, and the directors and employees of Hoover, Ltd., presented two electric cleaners.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Colonel Ropner was informed by the Minister of Fuel and Power (Mr. Gaitskell) that about 3,000 farms were connected to the public supply in the year ended September 30th last.

Steel Priority System

Mr. Marquand, Paymaster-General, in a statement on steel priorities, said that early in 1947 a special priority was given to the requirements of programmes which contributed to the expansion of fuel and power resources. This involved the grant of special priority symbols for the whole of the approved steel requirements for those programmes. It was now necessary to assure supplies of steel, as far as was possible, for programmes which contributed to exports or (like agriculture) to the saving of imports.

Adding the whole of these large programmes to the existing priority programmes would tend to make the priority label meaningless. The machinery for the allocation of steel was now under review with the object of ensuring that deliveries of steel more closely matched the allocations. It would thus become possible gradually to reduce bulk priority authorizations without detriment to the carrying out of the programmes concerned. It had been decided to introduce concurrently a strictly limited system of selective priorities, by means of which Departments responsible for the existing priority programmes or for export or import saving programmes would be able to authorize the use of the priority symbol to a very limited extent and in specific cases where essential production might be held up for lack of particular quantities or qualities of steel. He emphasized that as soon as this scheme was in operation priority in supply of steel would apply only to orders duly authorized on a form which bore the initials "P.M.L."

Mr. Eden and other members criticized this statement, being dissatisfied about the position of agriculture.

Engineering Research

Mr. McKinlay asked the Lord President of the Council if any decision had been taken on the siting of the Engineering Research Station for the West of Scotland.

Mr. Morrison said that after consultation with the Secretary of State for Scotland, he proposed that the Mechanical Engineering Research Establishment should be located in the area of the new town at East Kilbride, and investigations into suitable sites were proceeding.

Furnace Elements

Improved Resistors for Elevated Temperatures

MOST makers of furnaces and muffles of the resistance type would welcome some kind of heating element better able to withstand, for a longer service life than available varieties, the elevated temperatures necessary for heat-treating metals and making ceramics.

Experimental investigation for several years has led Mr. S. H. Parsonage, 42, Pall Mall, London, S.W.1, to announce the development of an improved resistor consisting of a graded conductor clad in a refractory tube with terminal leads embodied in metallized vitreous end-seals. The protective tube is preferably made of pure re-crystallized aluminium oxide, but other substances might be employed at lower temperatures. The conducting core can be graded by electrically butt-welding together lengths of different cross-sectional areas; or, better still, the union can be effected by a resistance sintering method developed for the purpose, which serves for both metallic and non-metallic conducting materials.

Minimum convenient overall dimensions of these resistors are a length of 12 in. and a diameter of $\frac{3}{4}$ in., representing a nominal loading of 250 W, the specific value naturally varying with the operating temperature. Control might be exercised by means of a variable voltage input transformer, or series-parallel switching of the resistor elements.

It is considered definitely advantageous to operate the resistors in series rather than in parallel, to secure the benefit of smaller currents at higher voltages. Additional resistors could be incorporated in the furnace chamber simply as "passengers," kept hot by conduction, for quick substitution in the event of faulty series elements needing to be short circuited by changing over connecting links bridging the terminals.

The conducting core is so graded as to maintain the middle portion of the tube within the hot chamber of the furnace, about one-third its total length, at a temperature of the order of 1,300 deg C., while that at the extremities need not exceed about 500 deg. C without water cooling or other wasteful means of dissipating end-heat. The conducting core is relatively loosely contained in the refractory tube, for the relief of expansion stresses, while the resistor as a whole "floats" between cup-shaped end terminals that are spring loaded in a way which minimizes spring deterioration by conduction of heat.

Load Spreading

Inexpensive Method of Indicating Approach of Maximum Demand

*By H. D. Irons and F. J. Hutton**

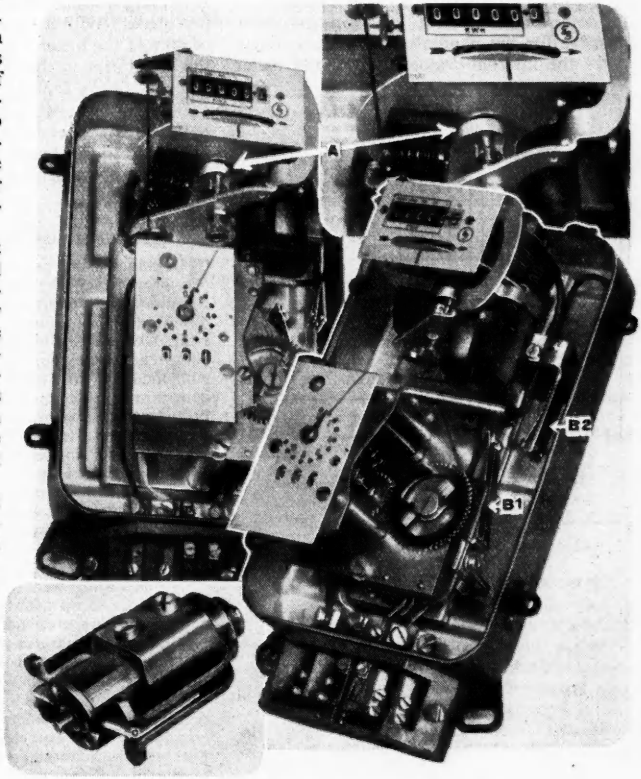
IN connection with the Government's direction to industrial consumers to limit their maximum demands for this winter to two-thirds of the values for November and December of last year, a variety of ways has been suggested to attain this object. One method which has been adopted is the re-arrangement of consumers' production programmes to prevent plants requiring a large amount of power being run simultaneously.

To ensure that such a scheme shall be effective, consumers should know when they are approaching a predetermined maximum load; this necessitates an alarm system to give audible and/or visual warning.

Maximum demand indicators as generally installed do not give sufficient indication for this purpose as it is quite possible for a load in excess of the pre-determined maximum to be taken for shorter periods than the usual resetting period of thirty minutes. This method is also unsatisfactory in that it entails constant observation and means the employment of some person continuously for this purpose.

The following is a reasonably simple and inexpensive method of providing a check on the load and also the facilities necessary to give the warning required.

To a suitable prepayment meter make the following modifications:—Fit an adjustable metal arm of suitable magnetic material to the spindle of the meter as shown in the illustration at "A." The effect of the brake magnet on this metal arm is to prevent the disc rotating until the current in the series coil is great enough to produce sufficient

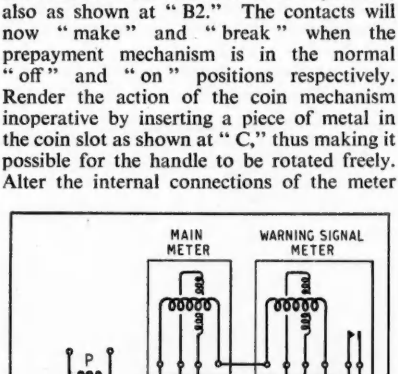


Views of the warning signal meter. A indicates magnetic arm, B1, B2 the reassembled switch in the alarm circuit, and C (bottom left) the metal insert rendering coin mechanism inoperative

* Meter Department, West Ham Electricity Undertaking

torque to overcome the attractive force between the magnet and the metal arm. This may be easily adjusted to any desired value.

Dismantle the moving contact arm from the trip mechanism and re-assemble in reverse, as shown at "B1." Remove the fixed contact arm and re-fit in new position, also as shown at "B2." The contacts will now "make" and "break" when the prepayment mechanism is in the normal "off" and "on" positions respectively. Render the action of the coin mechanism inoperative by inserting a piece of metal in the coin slot as shown at "C," thus making it possible for the handle to be rotated freely. Alter the internal connections of the meter



Alteration of meter internal connections

to those shown in the circuit diagram so that the switch may now be utilized to operate audible and/or visual warning signals.

While the modifications and details refer to a particular make of prepayment meter, they are applicable to most makes in common use. The modified meter is connected in series with the consumer's main meter, and the coin handle is turned once in a clockwise direction. This action opens the switch at "B" and the meter is now "set." If the consumption is below that for which the meter has been calibrated, the meter will remain stationary. When this value is exceeded, the disc will rotate and, after a certain lag depending on the size of the meter, current taken and ratio of the price-change wheels, the trip gear of the prepayment mechanism will operate, thus closing the switch. With the addition of suitable auxiliary gear this will give the desired warning. The meter is then "re-set" by turning the coin handle in a clockwise direction. The coin index will record the number of times the maximum demand has been exceeded, and the "unit" counter the number of kWh consumed during the overload period.

The following hypothetical example illustrates the method of calibration. Consumer's supply: 200-V, 50-cycle, two-phase, three-wire. Permissible maximum demand: 50 kW. Assuming a balanced system, this is 25 kW per phase. With a current-transformer ratio of 40 to 1 the meter is calibrated by adjusting the metal arm so that it just begins to rotate when a load of $\frac{25{,}000}{40} = 625$ W is applied.

We thank the management of the West Ham Electricity Department for permission to publish these details.

London Medical Exhibition

THE increasing part played by electricity in preventing, diagnosing and treating illness was made very apparent by displays at the London Medical Exhibition at the New Horticultural Hall, Westminster, last week. One of the most comprehensive exhibits was by Philips Electrical, who included on their stand a radio-frequency generator; an electro-therapeutic unit which provides currents for galvanization, electrolysis, muscle-reaction testing and muscle stimulation; an electro-cardiograph; ultra-violet, infra-red and radio-heat equipments; and a full range of electro-medical accessories. An entirely new form of the well-known Kromayer lamp for the focal application of intense ultra-violet radiation was to be seen among examples of ultra-violet and infra-red lamps shown by Hanovia, who were also demonstrating a fluorescent lamp for diagnosis, chemical analysis, testing, etc.

Electronic apparatus for measuring human functions and potentials is a speciality of Light Laboratories, among whose exhibits were a skin thermometer, a dermohmeter for skin resistance measurements, high-gain biological amplifiers and an electronic time marker. Diathermy apparatus especially intended for the treatment of eyes was shown by C. Denis Keeler and Theodore Hamblin, the latter also making electric revolving test types. Electrical inhalers were exhibited by Aerosols. Several types of hearing aids, were to be seen on the stands of the Telephone & Microphone Co., Multitone Electric Co., Allen & Hanbury and John Bell & Croyden. The last-mentioned company also featured ultra-violet and infra-red apparatus, galvanic and faradic portable sets and sterilizers.

COMMERCE and INDUSTRY

E.D.A.'s Future. New Staff Organization.

AT the October meeting of the Council of the British Electrical Development Association, the vice-chairman, Mr. J. Eccles (who is a member of the British Electricity Authority) said that that Authority had decided to ask the Association to carry on as a separate organization until the end of 1948, when the matter would be subject to review in the light of experience. Some modification in the membership of the Council would be required to limit it to representatives of the Area Electricity Boards, either members or senior staff, and of the British Electricity Authority.

A letter which the B.E.A. was sending to undertakings would contain authority for them to continue their subscriptions for a further year.

Overseas Trade Film

A film entitled "Overseas Trade," made for the Banking Information Service, was shown last week at the British Council's Theatre, Hanover Street, W.1. This shows the development of international trade from the earliest times to the present day and illustrates the service given by the banks to facilitate the exchange of and payment for goods.

Portsmouth Training Scheme

Opportunities for young men are attractively set out in a brochure produced by the Portsmouth Electricity Service (engineer and manager, Mr. R. H. Coates). After a foreword by the chairman of the Electricity Committee (Alderman J. P. Lacey) a chapter is devoted to the operations of the undertaking. This is followed by a review of the training schemes for trade apprentices, students and administrative aspirants, which are dealt with in detail in subsequent sections. Instruction is given in thirteen trades and the technical courses are designed to enable National Certificates to be gained by apprentices.

Studentships are granted to young men who have taken a full-time technical education course and an engineering degree or who possess qualifications for the graduateship of one of the principal engineering institutions. The course is for three years during which a salary of from £240 to £300 is paid.

The administrative course occupies five years and salary is paid according to the student's age. The brochure concludes with particulars of various amenities available to apprentices and students.

Next Year's Convention

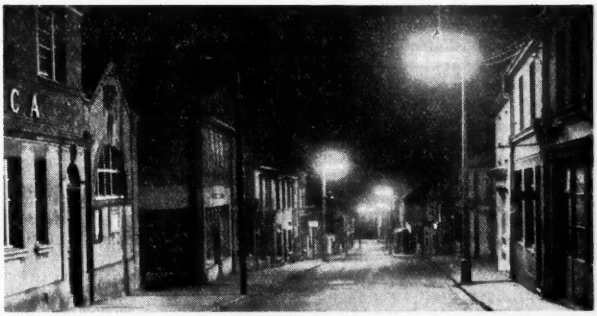
It has now been decided that the 1947 electrical convention being organized by the Incorporated Municipal Electrical Association shall be held at Eastbourne from June 7th to 11th with headquarters at the Grand Hotel.

New Cable to Holland

The Post Office cable ship, *Monarch*, is laying a new type of coaxial cable between Aldeburgh, Suffolk, and Domburg, Walcheren, Holland. This cable will be capable of permitting eighty-four telephone conversations simultaneously without the use of submerged repeaters.

Fluorescent Lighting

A fluorescent street lighting installation was commissioned in Fore Street, Saltash, Cornwall, on October 20th. The switching-on ceremony, which was performed by the Mayor of Saltash, was attended by representatives from many of the principal cities and towns in the south-west, together with representatives of the British-Thomson Houston Co., Ltd., who designed and provided the equipment. Six "Mazdalux" fluorescent street lighting lanterns have been mounted on special Concrete Utilities columns at a height of 25 ft and spaced, three to each side of the road, at intervals of approximately 120 ft. These lanterns, which are of silicon-aluminium alloy construction, have a neat appearance in daytime and are designed for use



B.T.H. "Mazdalux" fluorescent street lighting lanterns in Fore Street, Saltash

with three 80-W, 5-ft lamps; the auxiliary gear is assembled in the lantern. The lamp and reflectors are protected from dust and the weather by a translucent plastic cover clamped to the body of the lantern. There are hinged covers at each end of the lantern, but it is only necessary to remove one of these for lamp changing and starter switch maintenance. Despite the high efficiency of the lamps—providing a total light output of 5,700 lumens per lantern—there is a marked absence of glare, and undesirable shadows are eliminated. The lantern is so designed that two of the lamps may be switched off, leaving a single lamp operating for late night " economy " lighting.

Administrative Staff Association

As the outcome of a meeting last month of representatives of the administrative staffs of members of the Incorporated Association of Electric Power Companies it has been decided to form a new association for members of administrative staffs whose salaries exceed £700 a year. The chairman of the new body, the Electricity Supply Senior Administrative Staff Association, is Mr. J. E. L. Wallace (Derby & Notts Co.), the vice-chairman Mr. W. J. Rowland (North Wales Co.) and the secretary and treasurer Mr. W. F. Cross (Edmundsons). Among the objects of the Association are the securing of adequate remuneration and satisfactory conditions of service for its members, the pooling of ideas and experience and collaboration with other organizations in matters of common interest. The organization will be on a regional basis with local branches and centres.

Mr. Cross says it is understood that the British Electricity Authority will be willing to receive representations from the Association when the establishment of joint machinery for the industry is discussed.

Diaries

The Amateur Photographer diary (price 3s. 4d. plus 1½d. postage), *The Autocar* motorist's diary and *The Motor Cycle* diary, for 1948 (3s. 8d. each, plus 1½d. postage) are now available from Iliffe & Sons, Ltd., Dorset House, Stamford Street, S.E.1. They are bound in imitation leather with a week to an opening. *The Amateur Photographer* diary has fifty-eight pages of reference material, which includes all kinds of information for the amateur photographer, *The Autocar* diary has sixty-four pages of information of value to the motorist, and *The Motor Cycle* diary eighty pages of data.

New Australian Companies

Among the electrical companies registered in Sydney (N.S.W.) recently are the Standard Electric Co. (Australia) Pty., Ltd. (£10,000), manufacturers of electrical goods ; Vulcan Electric, Ltd. (£20,000), manufacturers of electrical appliances; and Stabilac Pty., Ltd. (£5,000), manufacturers of electrical controlling, regulating and stabilizing equipment.

Servex Industries, Ltd., is being formed with a nominal capital of £250,000 to acquire controlling interest in four subsidiaries manufacturing household electrical appliances and commercial heating and cooking equipment.

Swedish-South African Trade

Mr. T. Ericson, managing director of A.S.E.A., the large Swedish electrical equipment manufacturers, during a visit to South Africa stated that Swedish industrialists were taking an increasing interest in the Union and that some of them were planning to extend their activities to that country. Mr. Ericson's visit was in connection with the £300,000 factory which his company is building in Pretoria for the production of transformers and other equipment.—*Reuter* (Johannesburg).

Fallen Cable Fatality

At an inquest at Llangwm, Pembrokeshire, last week, on a woman who received a fatal shock when she took hold of a fallen electric wire, the coroner, returning a verdict of " Accidental death," said that no blame attached to anyone. Mr. C. H. Davies, resident engineer at Haverfordwest with the West Cambrian Power Co., said that possibly the gale the night before had caused the wires to touch and " flash," making them less able to withstand the pressure of the wind.

Sales Managers' Conference

The Incorporated Sales Managers' Association will open its fourteenth annual conference at the Burlington Hotel, Boscombe, on May 21st, 1948.

Dissolution of Partnership

Messrs. C. T. Senior and J. Coles, carrying on business as electricians at 19, High Street, Waltham Cross, Herts, under the style or firm of C. & S. Electric, have dissolved partnership. Mr. Senior will attend to debts.

Tower Clock for Withernsea

A large clock of the electrically-wound type is the war memorial selected by the East Yorkshire town of Withernsea and was recently installed in the tower of the parish church. It has four dials and strikes the hour on the tenor of the ring of six bells in the tower. The decision to install an auto-wound clock is an endeavour to minimize the effects of power cuts and variations of frequency.

Both the timekeeping and striking mechanisms are weight-driven and the pendulum is provided with zinc-iron temperature compensation. As the driving weight descends on an endless chain, a small jockey-weight hanging from a sprocket running on the opposite loop of the chain is raised so as to operate the switching mechanism

controlling the circuit of the re-winding motor.

Identical arrangements are provided for re-winding the weight which drives the striking mechanism. Both sets of Igranic switchgear are mounted on a light girder framework above the main portion of the clock where they are accessible for servicing. The winding motors are bolted to platforms attached to the main clock frame and can be removed and replaced without dismantling any other parts of the clock itself, which was constructed and installed by Chas. H. Potts & Co., Ltd., Leeds.

Hoffmann Jubilee

On January 11th next the Hoffmann Manufacturing Co., Ltd., Chelmsford, will celebrate the fiftieth anniversary of its founding. The ball-bearing factory at Chelmsford has been expanded many times and it has been necessary to manufacture outside Chelmsford. During the war a factory in Ireland was built and operated. In the fifty years of the company's existence, many of the employees have attained records of long service and during 1947 sixty-four men with forty years' service and seven women with thirty-five years' were given long-service awards.

Scientific Workers' Salaries

We have received from the Association of Scientific Workers a copy of a charter for the technical staff in the engineering and metallurgical industries. The charter, printed copies of which will be available within the next month, sets out a salary structure intended to apply to engineers, metallurgists, chemists and other scientific and technical workers employed in laboratories, design development and test departments, etc.

Calendar

The Hotpoint Electric Appliance Co., Ltd., has sent us a useful wall calendar for 1948 showing three months on each sheet. The company has also sent us a notebook slotted into a neat red leather cover enabling refills to be easily inserted.

"Old N'ions"

The annual dinner of the Old N'ions Association (the Northampton Engineering College Past Students' Association) is being held on December 12th at the Criterion Restaurant, London, when the guest of honour will be Col. Sir A. Stanley Angwin, chairman of Cable & Wireless, Ltd.

To commemorate colleagues who fell during the war it is proposed to provide a plaque, similar to that erected after the 1914-18 war in the Students' Committee Room at the College. It is also proposed to administrate a Trust Fund to provide the means of sending students on post-graduate visits to other countries to observe, and learn to evaluate, the methods and procedures employed by other nationals in the industry of the student's choice. Subscriptions to the memorial fund can be made by means of a seven-year covenant or by donations. Particulars can be obtained from Mr. J. Mortimer Hawkins, hon. secretary of the "Old N'ions," 115-117, Cannon Street, London, E.C.4.

Met-Vick Window Display

A window display which is attracting much attention has been arranged by the Metropolitan-Vickers Electrical Co., Ltd., at Crown House, Aldwych, W.C.2. This has been designed to

Model turbo-alternator in Met-Vick Company's window

illustrate the large power station equipment manufactured by the company and has as its main feature a detailed scale model of a 54,000-kW high-pressure, two-axis, turbo-alternator at Brimsdown power station.

Trade Announcements

Leonard Heys, Ltd., inform us that plans to open a depot in New Zealand are well advanced. The company's premises will be situated in Auckland and are expected to be opened for business in May, 1948. Mr. G. A. Taylor will be in charge. The New Zealand Branch (which will buy through its Blackpool head office) will be concerned exclusively with the distribution of radio and electrical merchandise to the New Zealand wholesale trade and electricity supply authorities.

The **Wellman Smith Owen Engineering Corporation, Ltd.,** announces that the address of its head office in London is now Parnell House (opposite Victoria Station), S.W.1. The telephone number and telegraphic address remain unchanged.

The London office of the **Hopkinson Electric Co., Ltd.,** is now at Eastdown Works, Dermody Road, Lewisham, S.E.13. (Tel. Lee Green 4911.)

Trade Publications

Revo Electric Co., Ltd., Tipton, Staffs.—Priced leaflet (No. 689) describing the "Revomatic" household kettle.

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Brochure (A.161) describing, with technical data, sodium industrial lighting fittings, lamps and accessories.

Sun Electrical Co., Ltd., 118, Charing Cross Road, London, W.C.2.—Priced brochures (No. 127) on propeller ventilating fans and (No. 728) on centrifugal and reciprocating pumps, including mobile and sump types.

Mullard Wireless Service Co., Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Radio valve equivalents and substitution types, base connections and prices arranged in calendar form.

Consolidated Research & Development, Ltd., 18, Cardiff Road, Luton, Beds.—Priced leaflet on " Novelite " combined book rest and reading lamp.

Fractional H.P. Motors, Ltd., West Heath Works, Rookery Way, Hendon, London, N.W.9.—Priced folder on " Sylentflo " hair dryer.

Murex, Ltd., Rainham, Essex.—Brochure briefly specifying ferro-alloys, metal powders and metallic carbides.

Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1.—Wholesale and export price list of household appliances and accessories.

Albert Taylor (Manchester), Ltd., Quay Street, Manchester, 3.—Priced sample card of "Nogap" insulating beads.

Romac Industries, Ltd., The Hyde, Hendon, London, N.W.9.—Priced catalogue of motor and cycle accessories, including lamps, cables and radio.

John Dugdill & Co., Ltd., Hazel Grove, Stockport.—Catalogue (No. 5) of local lighting fittings of the adjustable arm type; all prices doubled, plus tax extra where applicable.

Arora Co., Rosebery Street, Loughborough, Leics.—Export bulletin illustrating fires and immersion heaters.

Change of Name

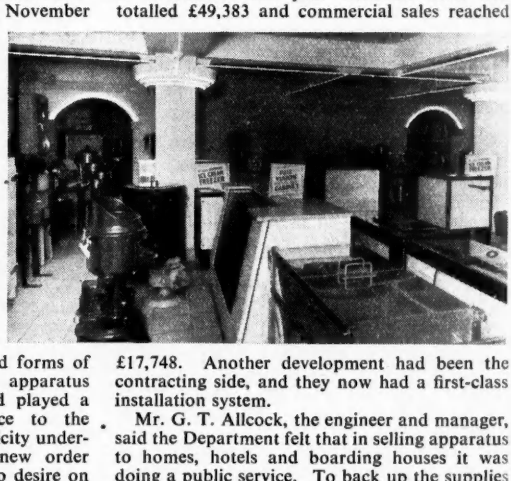
The Reynolds Tube Co., Ltd., has changed its name to Reynolds Light Alloys, Ltd.

Gt. Yarmouth Showroom Extension

AN ice-cream plant to enable the small manufacturer to make ice-cream in conformity with the Ministry of Health's heat treatment regulations was one of the principal exhibits in a new catering equipment advisory section, which was opened at Electric House, Great Yarmouth Corporation Electricity Department, on November 19th, by Mr. E. W. Bussey of the British Electricity Authority. This is an extension of the showroom devoted to heavy-duty catering cooking equipment.

Mr. Bussey said that the developments in Yarmouth were part of a change that had been brought about as a result of the war, which had to some extent torn up home life and created a demand for a communal form of life. This had led to canteens and other centralized forms of feeding, which required specialized apparatus in which the electrical industry had played a predominant part. In a reference to the approaching nationalization of electricity undertakings, Mr. Bussey said in the new order which was coming there would be no desire on the Authority's part to stultify initiative and individuality. They desired to see the supply authorities rendering the best possible service to the people and ensure that the manufacturers developed the best types of apparatus for the use of the people.

The Mayor (Mr. F. H. Stone), who is chairman of the Electricity Committee, spoke of the great extension of the Electricity Department. From April, 1946, to March, 1947, sales of domestic apparatus had been £62,568, and of commercial plant £14,564. In the 7½ months to November this year domestic sales had totalled £49,383 and commercial sales reached £17,748. Another development had been the contracting side, and they now had a first-class installation system.



Extension of the showroom of Great Yarmouth Electricity Department

Mr. G. T. Allcock, the engineer and manager, said the Department felt that in selling apparatus to homes, hotels and boarding houses it was doing a public service. To back up the supplies of commercial catering and refrigeration plant, they had created an efficient installation and maintenance service. He had been told they were wrong in selling electrical apparatus when electricity was short. Electricity, however, was efficient and, generally speaking, it gave results with a minimum consumption of fuel.

Overseas Electrical Trade

Varied Trends in Exports

IN October the value of electrical exports amounted to £6,777,249, an advance of £1,153,969, or about 20 per cent, on the corresponding month of last year. The total, however, was not so good as in September (£7,318,093) despite the extra working day. Fluctuations in shipments of some of the heavier types of plant, particularly generators (£464,772 in October compared with £953,217 in September) were largely responsible for the decrease, although in point of fact exactly half the forty classifications in Table I reflect reductions on the previous month. On the other hand exports of switchgear and switchboards were substantially greater, amounting in value to £470,763 against £376,178 in September and a 1938 monthly average of £184,533. In the first ten months of this year exports of this kind have totalled £3,690,299 against £1,992,274 in the corresponding period of 1946.

Wires and cables (other than telegraph and telephone) show a further advance, from £954,504 in September to £1,142,949 last month, and so far this year have attained an aggregate value of £8,294,675 against £6,090,463 up to the end of October, 1946.

Table I.—Electrical Exports and Imports

Class	Exports			Imports		
	Oct., 1947	Oct., 1946	Monthly Av., 1938	Oct., 1947	Oct., 1946	Monthly Av., 1938
	£	£	£	£	£	£
Telegraph and telephone wires and cables, submarine	18,862	21,854	17,289			
Ditto, not submarine	344,861	163,909	71,803			
Wires and cables, other than telephone and telegraph, rubber insulated	564,359	307,655	117,533	8,486	3,113	31,246
Ditto, insulation other than rubber	578,590	401,412	153,256			
Commercial radio apparatus	169,624	115,948	28,296	*	*	*
Domestic radio receivers	357,044	531,241	36,755	593	8,234	10,148
Telegraph, telephone and signalling apparatus	†521,521	532,683	242,716	4,347	1,346	9,243
Other radio, etc., apparatus	213,683	133,437	57,848	27,852	1,316,762	47,870
Valves	142,639	121,421	41,272	44,133	15,563	10,893
Electric carbons, furnace	*	*	*	41,881	—	4,054
Other electric carbons	*	*	*	3,837	5,517	2,301
Electric lamps	123,741	138,549	49,440	4,217	1,445	10,265
Other lighting apparatus	331,137	250,593	48,565	5,308	2,444	38,662
Primary batteries	51,060	38,379	13,572	556	853	3,549
Accumulators for motor vehicles	94,611	100,382	16,418	*	*	*
Ditto, other portable	70,602	25,985	12,456	*	*	*
Ditto, stationary	26,073	16,600	19,773	*	*	*
Ditto, parts and accessories	42,766	55,197	*	*	*	*
Electric cooking and heating apparatus	233,025	151,689	30,664	*	*	*
Commercial electrical instruments, including ammeters, voltmeters, etc., and parts	94,963	78,341	15,878			
House service meters	136,070	66,360	15,791	26,418	2,782	32,057
Other electrical instruments	84,826	57,079	9,612			
Electro-medical apparatus other than X-ray	14,386	22,445	3,038	*	*	*
X-ray apparatus, vacuum tubes and parts	39,730	206,845	4,881	43,073	22,239	9,734
Insulating materials, not elsewhere specified	110,544	136,742	19,343	*	*	*
Unclassified electrical goods and apparatus	324,400	394,567	108,083	27,025	13,984	52,980
Generators, complete up to 200 kW	152,144	115,927	38,071	*	*	*
Ditto, over 200 kW	161,789	228,342	119,079	*	*	*
Ditto, parts	150,839	40,624	*	*	*	*
Railway and tramway motors	40,886	37,785	15,977			
Other motors up to ½ h.p.	44,829	26,177	9,001			
Ditto, over ½ h.p. but under 1 h.p.	39,968	16,873	2,470	32,312	1,399	26,033
Ditto, 1–250 h.p.	296,819	213,120	96,637			
Ditto, over 250 h.p.	49,665	16,944	20,960			
Converting machinery	9,631	96,195	101,304	*	*	*
Transformers including coils	280,754	164,252				
Rectifiers for power house use	16,767	17,203	3,463	*	*	*
Motor starting and controlling gear	143,307	79,696	50,866	*	*	*
Switchgear and switchboards, other than telegraph or telephone	470,763	322,858	184,533	*	*	*
Other electrical machinery	26,499	20,590	15,497	62,732	4,576	14,455
Electric vacuum cleaners and parts	177,338	101,352	26,662	*	*	*
Other electrically-operated portable appliances	26,134	56,029	10,394	3,032	2,611	24,627
Total	6,777,249	5,623,280	1,829,198	335,802	1,402,868	328,117

* Not classified separately. † The figures for 1947 are not strictly comparable with those for previous years.

The leading customer last month was South Africa with £193,028 (£97,606 in October, 1946); India took the second place with £152,405 (£80,916) and New Zealand third place with £83,941 (£30,733).

Exports of radio sets, which have made a valuable contribution to the growth of British overseas electrical trade, fell away in October, with a value of £357,044 compared with £425,656 in September and £531,241 in October, 1946. The total for the ten months of the year, however, at £3,849,920, is no less than ten times as much as the 1938 figure (five-sixths of the annual amount). Shipments of commercial radio apparatus (transmitters for public broadcasting and television, and radio communication and navigational aid, including radar), with a value of £169,624 in October, were up on September (£104,388) as well as October, 1946 (£115,948).

Table II.—Distribution of Exports of Electrical Goods and Apparatus

Destination	Oct., 1947	Oct., 1946	Monthly Av., 1938
	£	£	£
Eire	214,531	127,890	37,726
Channel Islands	61,655	43,932	12,177
Palestine	67,847	88,495	8,426
British West Africa	48,144	32,087	12,889
Union of South Africa	697,748	599,847	162,584
Southern Rhodesia	91,969	32,493	9,632
British East Africa	63,753	29,268	7,893
British India	666,178	647,291	123,789
Burma	31,541	16,559	5,337
British Malaya	116,312	202,406	32,792
Ceylon	52,025	20,845	15,048
Hong Kong	55,949	37,988	12,939
Australia	283,815	211,444	197,366
New Zealand	257,121	123,064	96,225
Canada	56,707	23,396	12,547
British West Indies	23,828	26,411	12,954
Other British Countries	124,530	66,284	21,265
Soviet Union	111,831	331,318	36,781
Finland	31,763	26,411	5,969
Sweden	133,933	64,689	14,948
Norway	162,427	97,715	12,881
Iceland	7,070	50,413	2,796
Denmark	58,840	72,763	18,907
Poland	25,875	30,794	9,702
Netherlands	86,262	74,757	22,010
Belgium	132,552	147,913	11,208
France	48,023	104,346	16,082
Switzerland	25,243	19,433	3,768
Portugal	65,339	44,070	6,512
Spain	17,629	5,166	3,813
Czechoslovakia	45,626	7,212	7,256
Yugoslavia	12,154	13,227	1,475
Greece	51,875	31,068	4,926
Turkey	48,789	52,886	7,684
Portuguese East Africa	18,753	5,830	6,942
Egypt	37,126	132,081	13,176
Iraq	106,255	40,558	5,530
Iran	92,081	44,942	16,345
China	56,894	68,566	4,119
United States of America	13,606	22,618	5,839
Mexico	14,914	10,741	1,466
Venezuela	39,350	17,955	2,936
Chile	7,813	14,370	6,635
Brazil	16,114	20,401	11,164
Argentine Republic	149,786	67,250	45,452
Other Foreign Countries	157,541	120,120	46,371
Total	4,689,117	4,069,313	1,134,284

An indication of domestic electrical development abroad is furnished by the rising exports of house-service meters. Last month these amounted to £136,070, twice as much as in the corresponding month of 1946; in 1938 the monthly average was only £15,791. Electric cooking and heating apparatus exports also make a good showing with an aggregate value so far this year of £2,213,543 against only £306,637 in 1938.

Table II indicates that a number of the lesser markets have become important buyers of British electrical goods and apparatus, as distinct from machinery. Noteworthy among these are Norway and Sweden.

Imports of electrical equipment were up compared with September's total (£322,641) and the same is true in comparison with October, 1946, if the large quantities of radio communication equipment are excluded. The greatest increase was in imports of motors, with a value of £32,312 compared with £1,399 a year ago.

The bulk of the imports of goods and apparatus again came from the United States (£138,913 out of a total of £237,726). Other suppliers included Canada (£53,794) and Switzerland (£10,557).

Sound Recording

WHEN addressing the Royal Society of Arts in London last week SIR ERNEST T. FISK (Electric & Musical Industries, Ltd.) stressed the desirability of recording "transient pulses" for the attainment of a higher standard of fidelity in the reproduction of sound.

He explained how the frequency distribution of irregular non-repeating wave-forms determined the tonal character of a particular sound. Those transient pulses were known to extend well up to the top limit of human hearing and even beyond it into the supersonic range. Sir Ernest disclosed that frequencies of up to 20,000 c/s were now being recorded on gramophone records produced by his organization. The fact should mean that every note and every tonal characteristic detectable by the human ear in an original performance could now be heard with equal fidelity indirectly off a gramophone record.

Sir Ernest's comprehensive historical survey of very early acoustic machines included a demonstration of the latest E.M.I. magnetic tape recorder specially designed and made in England for use in broadcasting stations and film studios. This is capable of recording a programme of up to 20 minutes' duration and is provided with play-back and erasing facilities.

Geneva Tariff Agreement

Easing International Trade

MEASURES agreed to at Geneva on October 30th to facilitate trade between the contracting parties (Australia, Belgium, Brazil, Burma, Canada, Ceylon, Chile, China, Cuba, Czechoslovakia, France, India, Lebanon, Luxemburg, Netherlands, New Zealand, Norway, Pakistan, Southern Rhodesia, South Africa, Syria, the United Kingdom and the United States) are included in a White Paper (Cmd. 7258, Stationery Office, 1s.) issued last week.

The General Agreement on Tariffs and Trade will come into force as soon as it has been accepted by contracting parties who account for at least 85 per cent of the total external trade of all signatories. The United Kingdom, the United States, Australia, Belgium, Canada, France, Luxemburg and the Netherlands, however, have agreed to apply the agreement provisionally as from January 1st next, with certain reservations. Other parties are at liberty to do the same.

The agreement provides that " most-favoured-nation " treatment shall be applied generally to all exports of the contracting parties, although certain special preferences and anti-dumping and countervailing duties may be retained within limits set down. It is also agreed that goods imported from any other contracting party shall not be subject to any internal taxes which are not applied to home-produced goods. Freedom of transit of goods across the territories of the contracting parties is also provided for.

Methods of determining values for Customs purposes are specified and a limit is placed on fees and charges in connection with importation and exportation. Provisions are included to minimize prohibitions of and restrictions on imports but special consideration is given to cases in which a party's external financial position and balance of payments are threatened. Other articles deal with exchange arrangements, subsidiaries, state-trading enterprises, frontier traffic, and customs unions.

Twenty tariff schedules are attached to the agreement and the general effect upon United Kingdom trade is reviewed in the White Paper.

Preliminary Comparison

A preliminary examination of the schedules and comparison with existing rates of duty shows that the United Kingdom has undertaken to maintain the duty on imported accumulators, portable mechanical appliances, vacuum cleaners, hair clippers, refrigerators and washing machines at 15 per cent *ad valorem* and that on motors and radio apparatus at 20 per cent. Among the items on which reductions are to be made are heating and cooking apparatus (from 15 to 10 per cent) and stationary i.c. engines (from 20 to 17½ per cent).

The United States is to reduce import duties on a number of electrical items including electrical porcelain (from 40 to 38 per cent), welding plant (25 to 15 per cent), switchgear and fans (25 to 17½ per cent), washing machines and cooking stoves (17½ to 10 per cent) and steam turbines (from 20 to 15 per cent).

Australia has agreed to reduce the British preferential tariff on *inter alia*, dynamo-electric machinery generally, some static transformers, induction coils, rectifiers, installation accessories, cooking appliances and irons (from 30 to 25 per cent); refrigerators (from 42½ to 30 per cent); insulating sheets (from 25 to 20 per cent); and mica manufactures (from 20 to 15 per cent). At the same time the rates under the intermediate (most-favoured-nation) tariff are reduced on refrigerators (from 75 to 55 per cent); cooking appliances (from 50 to 45 per cent); motors (from 50 to 40 per cent); and meters (from 15 to 10 per cent—free under the British preferential tariff).

In the case of India the general tariff on refrigerators is to be lowered from 36 to 30 per cent, the British preferential rate remaining at 24 per cent. The duty on electromedical apparatus which is the same under both tariffs is to be reduced from 30 to 20 per cent and that on passenger lifts from 30 to 25 per cent.

South Africa has, *inter alia*, agreed to admit refrigerators free of duty. As regards New Zealand there appears to be little, if any, change affecting electrical goods.

School Canteens

THE Council of the British Electrical Development Association has drawn the attention of directors of education throughout the country to the desirability of ensuring that staffs of school canteens are adequately trained in the operation of electric cooking equipment with a view to securing the most economical and efficient use of the equipment. In a letter Mr. V. W. Dale, general manager and secretary of E.D.A., states that in many electricity supply areas the service of a competent demonstrator or housecraft adviser is available, and he recommends that directors of education should communicate with the management of their local electricity undertaking if it is felt that collaboration between members of their staff and the undertaking's demonstrator might prove to be mutually advantageous. The E.D.A. Council has, at the same time, written to electricity supply undertakings asking them to continue to co-operate with canteen staffs in schools, institutions and factories, with a view to ensuring that heavy-duty and other cooking equipment is operated satisfactorily.

ELECTRICITY SUPPLY

Darwen District Heating Scheme. Grid Tariff in N.E. Area.

Aldershot.—INDUSTRIAL SUPPLIES.—The Corporation has approved plans for supplying electricity to the North Lane industrial site at an estimated cost of £2,750.

Aylesbury.—PROMPT PAYMENT DISCOUNT.—To encourage consumers to pay their accounts quickly a discount of 5 per cent is to be allowed on accounts paid within 14 days. This discount applies also to collections from slot meters.

Barrow-in-Furness.—RURAL ELECTRIFICATION.—The Corporation is applying to the Electricity Commissioners for sanction to the borrowing of £24,026 in connection with the extension of the rural electrification schemes from High Newton to Newby Bridge, and from High Newton along Carthel Fell.

Bradford.—REMOTE CONTROL OF STREET LIGHTING.—When equipment is available all the electric street lamps will be switched on and off by remote control, a system which is already operating in part of the city centre.

Crayford.—STREET LIGHTING.—The U.D.C. has approved a scheme costing £14,687 for the electric lighting of main roads.

Darwen.—DISTRICT HEATING SCHEME.—The Corporation's £500,000 district heating scheme, which will provide industrial premises and houses with steam or hot water " on tap," was taken a stage further on November 18th when the Town Council decided to promote the necessary Parliamentary Bill during 1947-48.

Douglas (I.o.M.).—REPAIRS TO PULROSE STATION.—The Corporation Electricity Committee has authorized repairs required for the maintenance of the Pulrose power station. Such work as can be carried out by the power station staff is to be put in hand forthwith, and tenders are to be invited for the remainder.

Eastbourne. — EXTENSIONS. — Approval has been given to the erection of a new substation in Churchdale Road at a cost of £4,880 including switchgear and cables; additional transformer capacity and improvements to l.v. distribution at Hailsham (£1,737); and small mains replacements in the town area (£1,480). Sanction has been received from the Electricity Commissioners to borrow £20,482 for new substations at Victoria Drive housing estate, Dukelands estate and Hydneye estate.

Glasgow. — PORTOBELLO EXTENSIONS. — A warrant for the erection of a new h.v. switchhouse, transformer houses, etc., at Portobello power station at a cost of £100,000 was granted to the Corporation at Edinburgh Dean of Guild Court on November 14th.

Heckmondwike.—CONSUMERS BENEFIT FROM REFUND.—The undertaking's refund from the Yorkshire Electric Power Co. following the Ilkley test case will amount to £5,734, less consultants' fee and expenses. In consequence the Council has decided, as a temporary measure, to remove the 12½ per cent addition to charges for lighting and power introduced in 1940.

Huddersfield.—LOANS.—The Council is applying for sanction to borrow £36,628 for substation equipment and mains; and £161,392 for No. 2 ring main, in connection with the 33-kV distribution scheme.

Leeds.—HOUSING SUPPLIES.—The Corporation is to provide electricity mains on the Cottingley Hall estate at a cost of £20,000.

North East England.—APPLICATION OF GRID TARIFF.—The Central Electricity Board has notified electricity undertakings in the North East England Area that the new grid tariff, which came into force throughout the other Scheme Areas of the country at the beginning of 1946, will be applied to North East England as from January 1st, 1948.

Nottingham.—SUPPLY FAILURE.—A complete breakdown of the electricity supply occurred on November 18th when a main transformer at the North Wilford generating station failed. The breakdown occurred at 7.52 a.m. but by 8.30 a.m. light and power were restored to certain parts of the city. A quarter of an hour later the supply was restored to practically the whole of the city.

Oldham.—POWER STATION EXTENSIONS.—The Electricity Committee has appointed Kennedy & Donkin as consulting engineers in connection with the proposed extensions to Chadderton station to act jointly with the chief engineer and manager to the Electricity Department.

SUPPLY TO HOUSING ESTATES.—Application is being made for consent to borrow £35,705 for cables required for the extension of supplies to the Limeside-Woodhouse housing estates.

Stockton-on-Tees.—INDUSTRIAL SUPPLIES.—An additional substation is to be erected on the Bowesfield Industrial Site at an estimated cost of £4,600 to afford a supply to the Riley Clock & Instrument Co., Ltd. Five-year agreements have been completed for supplying two new factories.

RADIO AND TELEVISION.—An interim report was submitted by the general manager (Mr. N. Hunter) on the progress of this new department. The Electricity Committee was pleased with the results so far obtained, and authorized the manager to enlarge the department.

COOKER REPAIR DEPARTMENT.—Additional temporary accommodation for extending this department has been obtained from premises adjacent to the electricity showrooms. This is only a temporary measure pending the completion of a new modern building.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Crabtree Electrical Industries, Ltd.—The holding company is paying a final dividend of 5 per cent together with a bonus of 7½ per cent, again making a total of 17½ per cent for the year. The accounts of the operating company, J. A. Crabtree & Co., Ltd., show a trading profit, with other receipts, of £241,250 for the year as compared with £249,605 for the previous year, and after providing for depreciation, expenditure on plant and machinery, E.P.T., income tax and profits tax, etc., there is a balance of £111,630 (against £107,178). Reserve receives £40,000 (£30,000), and £70,000 is again paid to the holding company in tax-free dividends. The balance carried forward is £82,665 (against £81,035 brought in).

Falk, Stadelmann & Co., Ltd.—In a statement circulated with the report and accounts and submitted at the annual meeting last Friday Mr. Gustav Falk (chairman and joint managing director) said that their works, in large degree, had been re-equipped to cope with post-war requirements. In fact, it could be claimed that their productive capacity was greatly in excess of that of pre-war days despite the difficulties which they were experiencing in obtaining machinery. If the shortages of labour and raw materials could be overcome there was every prospect of a further expansion in output. During the past year the volume of their export trade had risen to a material extent. Although export trading was becoming more difficult by reason of growing competition and the import restrictions in many countries he hoped they could anticipate a further increase in this section.

Holophane, Ltd., reports a net profit for the year to June 30th of £34,003, as compared with £25,418 for the preceding year. After providing for taxation it is proposed to pay a final dividend of 7½ per cent, making 15 per cent for the year (against 12½ per cent), and to carry forward £23,498 (against £20,993 brought in).

The Associated Equipment Co., Ltd., reports a net profit for 1946-47 (after deducting taxes and depreciation) of £237,500, as compared with £282,500 for 1945-46. The final dividend on the ordinary stock is 1s. 6d. (against 2s.), free of tax, maintaining the distribution for the year at 2s. 6d. or 12½ per cent.

Victoria Falls & Transvaal Power Co., Ltd.—Presiding at the annual meeting held on November 18th, Mr. A. E. Hadley (chairman and managing director) said that the sales of electricity during 1946 were upwards of 4,168 million kWh, constituting a record output. To meet the future requirements of the mining industry and other consumers, important extensions to the Vaal station were in hand, and under consideration in the case of the Witbank station. A large extension of the transmission system was also in hand to meet these future requirements. With regard to the future, their business was granted a licence in 1910 under which the Government retained the right to expropriate the undertaking in the Union at the end of 1950, and the Electricity Supply Commission had indicated that it would like to take over the undertaking at an earlier date. The company had therefore started conversations with the Commission with the object of arriving at an arrangement fair to both sides.

Sun Electrical Co., Ltd.—The accounts for the year ended April 30th last show a trading profit of £60,195 (against £22,527 for 1945-46). A sum of £17,000 (£1,000) is provided for E.P.T. and profits tax, £4,500 (£855) for deferred repairs and £1,665 (£1,123) for depreciation, the net profit being £37,304 (£20,106). General, lease redemption and income tax reserves receive £13,450 (£5,000) and the dividend on the ordinary shares is raised from 4½ to 7½ per cent, £8,125 (£2,144) being carried forward.

In a statement circulated with the accounts the chairman (Mr. A. G. Beaver) says that during the past financial year they were able to put into operation the plans formulated in 1939 for the expansion of their wholesale distributive service. The success of this is shown by the material increase in turnover, which has continued to expand during the current year.

The Calcutta Tramways Co., Ltd., reports a balance of revenue account of £291,446, as compared with £589,215 for the preceding year. After providing for Indian and British taxation, debenture interest and redemption, meeting the preference dividend and providing for contingencies, a balance of £59,018 is carried forward (against £58,293 brought in). No ordinary dividend is paid (against 10 per cent).

Anglo-Argentine Tramways, Ltd.—After charging £185,256 for debenture service there was a net loss for 1946 of £208,441 (compared with a loss of £195,545 for 1945) which has been written off out of general reserve. The report states that while fares remain at their present low level there are no prospects of any dividend being paid by the Buenos Aires Transport Corporation (to which the undertaking was transferred in 1939).

Marco Refrigerators, Ltd., is paying a final dividend of 22½ per cent, making 30 per cent for the year (against 10 per cent).

The Telephone Manufacturing Co., Ltd., has declared an interim dividend of 2½ per cent (unchanged).

J. & F. Stone Lighting & Radio, Ltd., reports trading profits and sundry receipts for the year ended June 30th last of £218,351, compared with £186,949 for 1945-46. To this is added £77,000 (£90,000) gross dividend from subsidiary company. The net profit after providing £140,000 (£126,380) for taxation is £143,800 (£139,289). The ordinary dividend for the year is maintained at 40 per cent with a "final" of 30 per cent and £16,203 (£12,853) is carried forward, after allocating £7,988 (£7,694) to preference redemption fund and £40,000 (same) as additional provision for future repairs and renewals. The chairman states that the company is making every effort to increase its export business. The demands of the home market are greater than ever.

British Rola, Ltd., shows a trading balance for the year to March 31st last of £11,293 (against £59,027). To this are added £695 (£5,987) receivable on completion of Government contracts, £6,742 (nil) trading reserves no longer required and £17,421 (£239) dividends, making £37,271 (£67,358). Tax requires £13,530 (£53,795) and it is proposed to pay an ordinary dividend of 10 per cent against 15 per cent last year, but on larger capital.

Ward & Goldstone, Ltd., are again paying an interim dividend of 20 per cent.

Stockholders' Representatives

The following appointments of stockholders' representatives under the regulations in connection with the Electricity Act, 1947, have been made:—

BRIG.-GEN. WADE H. HAYES, 24-30, Gillingham Street, S.W.1.—Edmundsons Electricity Corporation, Ltd., and associated companies.

MR. LESLIE C. GAMAGE, Magnet House, Kingsway, W.C.2.—Aberayron & District Electricity Supply & Power Co., Ltd., and other companies in the Electric Development & Securities Trust group.

MR. A. J. FIPPARD, Brook House, Park Lane, W.1.—Electric Supply Corporation, Ltd.

MR. J. B. BRAITHWAITE, Alder House, 1-6, Aldersgate Street, E.C.1.—City of London Electric Lighting Co., Ltd.

MR. R. M. PEAT, 11, Ironmonger Lane, E.C.2.—Sussex Electricity Supply Co., Ltd., and other companies controlled by the Southern Areas Electric Corporation.

MR. W. S. HESLOP, 57, Grainger Street, Newcastle-on-Tyne.—Newcastle & District Electric Lighting Co., Ltd.

New Companies

Thomson Electrical Services, Ltd.—Registered November 13th. Capital, £1,000. Electrical and general engineers and contractors, etc. G. H. Thomson is the permanent director. Regd. office: 501, Croydon Road, Beckenham.

Electrical Services (Windermere), Ltd.—Registered November 10th. Capital, £6,000. To acquire the business of an electrical engineer carried on by J. W. Adams at Ash Street, Windermere, as Electrical Services, and to carry on the business of wireless engineers and experts, etc. Directors: J. W. Adams, T. C. Pattinson and E. Farrer. Regd. office: West End Buildings, Windermere.

Nott & Stuart, Ltd.—Registered November 12th. Capital, £1,000. Designers, manufacturers and dealers in transformers, lamination products, sound recording machines and equipment, radio and television receivers and accessories, etc. Permanent directors: W. J. C. Nott and A. P. J. Stuart. Regd. office: 71, West Walls, Carlisle, Cumberland.

Bufton Electric Co., Ltd.—Registered November 17th. Capital, £1,000. Electrical engineers and contractors, etc. Directors: J. H. Bufton and Mrs. Audrey Bufton. Regd. office: 13a, Eyre Lane, Sheffield.

Companies to be Struck Off Register

The following companies are to be struck off the register at the end of three months from November 18th, unless cause is shown to the contrary:—A.V.A. Battery Co., Ltd., Carey Electrical, Ltd., and Hulme's Radio Services, Ltd.

Bankruptcies

C. F. Du Bock, formerly trading as the Bright Electric Co., of and lately carrying on business at 55, Ridley Road, Forest Gate, London, E.7, formerly of Orme House, Romford Road, Forest Gate, E.7, electric lamp distributor.—Order made October 16th suspending bankrupt's discharge for four months, and that he be discharged as from February 16th, 1948.

A. Fielding, electrician, residing and carrying on business at 223, Whalley New Road, Blackburn.—Application for discharge to be heard on December 15th at 64, Victoria Street, Blackburn.

N. F. Peat & Sons, electrical engineers, 28a, Blackheath Village, Blackheath, London.—Receiving order dated April 25th, 1947, rescinded and petition filed February 8th, 1947, dismissed. Date of rescission November 7th, 1947, on the grounds that debts have been paid in full.

Liquidations

Mayer & Co. (1932), Ltd., Exchange Buildings, Broad Street, Barry, electrical engineers.—At a recent meeting of creditors at Cardiff it was decided to confirm the voluntary liquidation of the company with Mr. S. Chater, 35, Windsor Place, Cardiff, as liquidator, together with a committee of inspection.

Receiver Appointed

Dotolite Co., Ltd.—H. W. Fisher, 36, Southampton Street, W.C.2, was appointed receiver and manager on November 5th, under powers contained in instrument dated July 23rd, 1946.

STOCKS AND SHARES

IT can be said without exaggeration that the effects of Mr. Dalton's autumn Budget have practically worn off in the Stock Exchange markets. The immediate consequence was a fairly general rise in the industrial groups, owing to a flow of investment capital into the stocks and shares of the popular undertakings. Money which had been held back by reason of the uncertainty attaching to the forthcoming proposals of the Government, made its influence felt when, upon removal of that uncertainty, capital became actively concerned to find some avenue for investment, instead of the cash being left on deposit with the banks.

The Firm Trend

The changes in prices since a month ago in the stocks and shares quoted in the following lists, show a fairly widespread improvement. The investor is said to be exercising a good deal of discrimination in his choice of stocks and shares, but personal observation makes it clear that a sympathetic firmness marks the general trend. What pronounced features there are in the price-lists, as compared with those of a month ago, usually have some special reason to account for them.

Tube Investments

Tube Investments £1 units, now 6¾, have been restored to the price ruling before the dividend announcement. Encouraged by the earlier increase in the interim from 10 to 12½ per cent, the optimists had been hoping for something more than a total of 25 per cent for the year. Disappointment on this score has, however, since been mitigated by consideration of an expansion of more than £2 millions in the group's total trading profits. A year ago, the company devoted £3¼ millions of accumulated resources to the acquisition of the Hercules Cycle business, with benefit of trading from January, 1946. The yield on the shares is £3 14s. per cent on the present distribution, which appears to be covered by an ample surplus of earnings.

Profits Tax and E.M.I.

Electric & Musical Industries published their dividend and accounts shortly before, and held the meeting just after, the emergency Budget. Consequently, the chairman had good reason to speak with feeling about the doubling of the tax on distributable earnings and, more particularly, about the back-dating of its effect to the beginning of this year. As he pointed out, the company is left in the position of having made no provision, in the accounts, for the tax as it affects half the year's profits. At 18s. 3d. the price is 9d. lower than it was a month ago. Market calculations as to the possible effects of the extra imposition on company dividends have resulted in very few price changes which might be attributed to that source. About the justice of a tax which falls exclusively on risk-bearing capital, the market has only one opinion.

Changes on the Month

Home electricity ordinary shares show no changes of importance, but amongst overseas electricity issues, Cawnpore Electrics have moved up 5s., while Calcutta Electric are $\frac{1}{16}$ easier. Calcutta Tramways fell 10s. to 30s. on the Board's decision not to pay a dividend on the ordinary this time. Victoria Falls advanced to 6⅝ before reacting to 6⅜, a certain amount of selling having followed the meeting at which the chairman stated that the Union Government may possibly exercise its powers of purchase in advance of the date, 1950, originally fixed. Jerusalem Electric and Palestine Electric are both easier for obvious reasons, and East African Power continue to be a dull spot. Nigerian Electrics at 33s. 9d. are 6s. 3d. lower. Atlas Electrics went back 1s., to 14s., on the chairman's broad hint that it may be some time yet before the shares come within sight of a dividend.

Equipment and Manufacturing

Industrial markets have benefited this week from the good coal production figures and from progress with the Marshall Plan. Telegraph Constructions at 53s. 9d. are 6s. 3d. higher on the month. De La Rue at 46s. 3d., Christy Bros. at 77s. 6d., and Chloride Electrical at £5, are each 2s. 6d. up. Associated Electricals, after their last month's fall, have recovered 3s. 9d., and are now 78s. 9d. Murex at 92s. 6d. are 5s. to the good. Crompton Parkinsons, British Aluminium, Henleys are all better, and a number of smaller rises have occurred in the list of electrical manufacturing and equipment shares. Elsewhere, Babcock & Wilcox at 72s. gained 2s. 6d. Imperial Chemicals spurted to 50s. 3d. Cable & Wireless stocks have gone back, and a fall of £4 lowered Great Northern Telegraphs to 27½. Telephone Properties have lost a florin, at 18s. 6d.

Cheap Money and Compensation

A tentative advance in the prices of electricity supply shares and Home Railway stocks was started by the change-over at the Exchequer, but petered out after the new Chancellor's reaffirmation of the cheap money policy. The movement was connected, of course, with considerations about the rate of interest at which the Government compensation stocks will be issued. Stockholders in no mind at present to accept a 2½ per cent stock in exchange for their holdings, might, it is thought, feel differently about a 3 per cent issue, particularly in view of the uncertainties involved just now with most forms of higher-yielding securities. Any developments, therefore, which might lead in that direction help to reduce the fear of heavy

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ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Est. Comp.*	Last Div.	Middle Month's Price Nov. 21	Rise or Fall	Yield p.c.
Home Electricity Ordinary					£ s. d.
Bournemouth and Poole	66/8	12½	61/–	..	4 2 0
British Power and Light	37/10	8	34/6	..	4 14 2
City of London ..	34/4	7	31/3	..	4 9 7
Clyde Valley ..	46/5	8	42/6	..	3 15 3
County of London	49/5	10	47/–	+6d.	4 7 0
Edmundsons ..	31/6	6	29/–	..	4 2 9
Elec.Dis.Yorkshire	51/–	9	46/6	..	3 17 4
Elec. Fin. and Securities ..	67/–	15	61/–	..	4 18 4
Elec. Supply Corporation ..	50/8	10	46/–	..	4 7 0
Lancs. Light and Power ..	37/7	7½	34/6	..	4 7 0
Llanelly Elec. ..	29/1	6	26/6	..	4 10 7
Lond.Assoc.Electric	29/6	6	27/–	..	4 9 0
London Electric	31/4	6	29/–	..	4 2 9
Metropolitan E.S.	48/–	9	44/–	..	4 1 10
Midland Counties	51/5	8	47/6	..	3 7 6
Mid. Elec. Power	47/–	9	42/6	..	4 5 0
Newcastle Elec...	32/7	7	30/–	..	4 13 4
North Eastern Elec.	36/6	7	33/6	..	4 3 4
Northampton ..	50/11	10	46/6	..	4 6 0
Northmet Power.	48/2	9	44/–	+6d.	4 1 10
Scottish Power ..	46/1	9	42/6	+6d.	4 5 9
Southern Areas ..	24/–	5½	23/–	–6d.	4 15 8
South London ..	33/–	7	30/–	..	4 10 4
Yorkshire Elec...	50/10	9	46/6	..	3 17 4

Company	Dividend Previous	Dividend Last	Middle Month's Price Nov. 21	Rise or Fall	Yield p.c.
Public Boards					
Central Electricity:					
1963–93 ..	3½	3½	102	..	3 8 8
1974–94 ..	3½	3½	101	..	3 3 9
London Elec. Trans.	2½	2½	96½	+1	2 12 4
Lond. Pass. Trans. Bd.					
A	4½	4½	124½	+2	3 12 4
B	5	5	119½	+2	4 3 8
C	3	3	61½	..	4 17 7
Overseas Electricity Companies					
Atlas Elec. ..	Nil	Nil	14/–	–1/–	—
Calcutta Elec. ..	6†	6†	51/3	–1/6	2 7 0
Cawnpore Elec...	13	13	55/–	+½	4 14 6
East African Power	7	7	44/–	–1/6	3 3 6
Jerusalem Elec...	5	6	24/6	–1/6	4 18 0
Madras Elec. ..	8	5	43/6	–1/–	2 6 0
Nigerian Elec. ..	12½	10	33/9	–6/3	5 18 4
Palestine Elec. "A"	6†	7†	31/9	–2/–	4 8 2
Perak Hydro-elec.	6	7	13/6	+6d.	—
Tokyo Elec. 6% .	—	—	53½	..	—
Victoria Falls Power	19	19½	6⅜	+⅜	2 7 2
Whitehall Inv. Pref.	—	6	25/–	+1/–	4 16 0
Equipment and Manufacturing					
Aron Elec. Ord...	10	15	50/–	+½	6 0 0
Assoc. Brit. Eng.	8	12	42/6	..	5 13 0

Company	Dividend Previous	Dividend Last	Middle Month's Price Nov. 21	Rise or Fall	Yield p.c.
Equipment and Manufacturing *(Continued)*					£ s. d.
Assoc. Elec.:					
Ord.	10	15	78/9	+⅛	3 16 2
Pref.	8	8	43/6	..	3 13 6
Automatic Tel.&El.	12½	12½	58/3	..	4 6 2
Babcock & Wilcox	12½	15	72/–	+½	4 3 4
Baldwin, H.J.(2/–)	10	20	10/–	..	4 0 0
British Aluminium	8	10	48/3	+3/–	4 3 0
B.I. Callender's..	—	6¾	37/–	+6d.	3 12 6
British Rola (2/–)	15	15	3/9	..	8 0 0
British Thermostat (5/–)	18½	23½	25/–	..	4 14 0
British Vac. Cleaner (5/–)	30	20	14/6	+9d.	6 18 0
Brush Ord.(5/–)..	10	4	6/3	..	—
Burco (5/–) ..	20	35	26/3	–9d.	6 13 4
Chloride El. Storage	20	20	5	+¼	4 0 0
Christy Bros. ..	17½	17½	77/6	+⅛	4 10 2
Cole, E. K. (5/–)	20	20	17/–	–1/6	5 17 8
Cossor, A. C. (5/–)	12½†	25†	18/6	–1/6	6 15 2
Crabtree (10/–) ..	17½	17½	38/9	..	4 10 2
Crompton Parkinson Ord. (5/–) ..	22½	22½	28/–	+2/–	4 0 4
De La Rue (5/–)	45	50	47/6	+⅝	5 5 1
Decca (1/–) ..	100	112½	31/3	..	3 12 0
E.M.I. (10/–) ..	8	6	18/3	–9d.	3 5 9
Elec. Construction	12½	12½	47/6	..	5 5 1
Enfield Cable Ord.	12½	7½	38/9	–⅛	3 17 4
English Electric .	10	10	52/9	..	3 15 0
Ericsson Tel. (5/–)	20†	20†	40/–	..	2 10 0
Ever Ready (5/–)	40	40	33/–	–6d.	6 1 3
Falk Stadelmann	10	15	45/–	+⅛	6 13 4
Ferranti Pref. ..	7	7	35/–	+⅛	4 0 0
G.E.C. Pref.	6½	6½	35/9	..	3 12 10
Ord.	17½	17½	86/3	+⅛	4 1 5
General Cable(5/–)	15	25	37/6	..	—
Greenwood & Batley	15	15	43/3	–1/9	6 18 9
H.T.A. (10/–) ..	10	10	14/6	+9d.	6 18 0
Heatrae (2/–) ..	12½	12½	5/–	..	5 0 0
Henley's (5/–) ..	20	20	26/–	+½	3 17 0
4½% Pref. ..	4½	4½	25/–	..	3 12 0
Hopkinsons ..	20	22½	5½	..	4 8 0
Intl. Combustion (5/–)	32½	37½	51/3	+⅛	3 13 2
Johnson & Phillips	15	15	71/3	+⅛	4 4 3
Lancashire Dynamo	22½	22½	5½	+¼	4 8 0
Laurence, Scott(5/–)	12½	12½	11/6	+6d.	5 8 8
London Elec. Wire	7½	10	45/–	+½	4 9 0
Mather & Platt ..	10	11	49/6	..	4 0 0
Metal Industries(B)	9	10	45/–	..	4 9 0
Mid. Elec. Mfg..	30	35	8½	–¼	4 6 2
Murex	20	20	92/6	+5/–	4 6 7
Newman Ind.(2/–)	22½	22½	6/9	..	6 13 7
Plessey (5/–) ..	20	30	23/9	+1/9	—
Parsons C. A. ..	—	12½	67/6	..	3 14 0
Pye Deferred (5/–)	25	25	20/6	–9d.	6 2 0
Radio & Tel. (2/–)	25	40	5/–	–9d.	—
Revo (10/–) ..	20	27½	50/9	..	5 8 6
Revrolle ..	12½	12½	65/9	–6d.	3 16 3
Scophony (5/–) ..	—	—	4/6	–6d.	—

(*Continued on page* 827)

* Proposed amount of British Electricity Stock to be allotted.
† Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Nov. 21	Month's Rise or Fall	Yield £ s. d.
Equipment and Manufacturing (*Continued*)					
Siemens Ord. ..	7½	7½	32/6	..	4 12 4
Strand Elec. (5/-)	12½	17½	10/9	+6d.	8 2 10
Switchgear&Cowans (5/-) ..	25	10	18/6	+1/6	2 15 2
T.C.C. (10/-) ..	12½	15	30/-	..	5 0 0
T.C. & M. ..	10	10	53/9	+6/3	3 14 1
Telephone Mfg.(5/-)	9	9	9/3	+3d.	4 18 8
Thorn Elec. (5/-)	20	25	22/6	+1/6	5 11 1
Tube Investments	22½	25	6¼	+17/6	3 14 0
Vactric (5/-) ..	Nil	Nil	15/-	..	—
Veritys (5/-) ..	7½	2½	5/-	+6d.	2 10 0
WalsallConduits(1/-)	55	70	51/3	..	5 9 4
Ward & Goldstone (5/-)	35	50	67/6	+1/6	3 15 9
Watford (2/-) ..	15	15	6/3	+3d.	4 16 0
WestinghouseBrake	14	14	62/6	..	4 9 5
West, Allen (5/-)	7½	10	10/-	..	5 0 0
Traction and Transport					
Brit.Elec.Traction:					
Def. Ord. ..	45	50	1325	..	3 15 6
Pref. Ord. ..	8	8	190	+5	4 4 3
Calcutta Trams..	7½	Nil	30/-	−10/-	—
Cape Elec. Trams	5	6	32/6	..	3 13 10
Traction and Transport (*Continued*)					
Southern Rly.:					
5% Prefd. ..	5	5	71½	+1	6 19 10
5% Pref. ..	5	5	116½	+3	4 5 10
T. Tilling ..	10	10	67/6	+3/6	2 19 3
West Riding ..	10	12	55/-	+½	4 7 3
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	134	+1½	4 9 7
Def.	1½	1½	29½	−1	5 1 8
Anglo-Portuguese	8	8	29/-	−1/-	5 10 4
Cable & Wireless:					
5½ Pref. ..	5½	5½	120½	−2	4 11 3
Ord.	4	4	171½	−3½	2 6 6
CanadianMarconi$1	Nil	4 cts.	10/-	..	—
Globe Tel. & Tel.:					
Ord.	8½†	5†	42/-	−2/-	2 7 8
Pref.	6	6	32/-	−1/-	3 15 0
GreatNorthernTel. (£10)	18	15	27½	−4	5 9 1
Inter. Tel. & Tel.	Nil	Nil	17½	..	—
Marconi-Marine..	7½	7½	28/9	+9d.	5 4 2
Oriental Tel. Ord.	4	10	52/-	+1/6	3 17 0
Telephone Props.	6	6	18/6	−2/-	6 9 9
Tele. Rentals (5/-)	10	10	11/3	−3d.	4 9 0

† Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from p.* 825)

selling of the compensation stocks after issue. This apprehension largely accounts for the persistent quotation of the stocks concerned at prices well below the fixed compensation figures.

Preference Shares Popular

The prejudice which prevailed in regard to the vulnerability of preference shares quoted at high premiums, and which, it was feared not very long ago, might run the risk of repayment at their par value, has practically vanished. To-day the demand for preference shares is as keen as it is difficult to satisfy. On frequent occasions, examples have been set out here of preference shares which were on offer in the market, but recent absorption of these preferences has created something like a scarcity. This is due to the fact that with gilt-edged securities standing upon a 2¾ to 3 per cent basis of yield, any sound preference that offers 3¾ to 4 per cent is assured of favourable attention. The higher that gilt-edged prices rise, so much the better, of course, for those of good class preference shares.

Anglo-Portuguese Telephone

Amongst shares upon which a yield of 5½ per cent is obtainable, Anglo-Portuguese Telephone may be quoted as a good example. For years past, the company has paid an annual dividend of 8 per cent on the ordinary shares, and, so far as can be seen at present, this rate is likely to be continued. The Portuguese Government can take over the company's undertaking in 1968 on payment of an amount to the company equal to the value of its assets as fixed by arbitration. The company pays the Portuguese Government a royalty, beginning at 3 per cent and not exceeding 5 per cent, of its gross profit, being thereafter exempt from all other taxation.

The company has a modest general reserve of £50,000, but for some years past has been building up a substantial reserve for renewals. Two years ago, this was £720,000; to-day it is £920,000. Goodwill stands in the balance sheet at £50,000. The shares can be bought about 29s., at which the return on the money is 5½ per cent, a yield indicating that they carry an element of speculation.

Reports on German and Japanese Industry

RECENTLY issued reports on German and Japanese industry, copies of which can be obtained from H.M. Stationery Office, include the following:—B.I.O.S. 1379, "Plastics in German Sound Recording Systems" (12s. 6d.). B.I.O.S. 1537, "Electrical Tachometers, Small Generators and Indicators" (3s. 6d.). F.I.A.T. 1111, "German Wind Turbine Projects Planned During the Hitler Era" (3s.). F.I.A.T. 1116, "Quick Calculation of A.C. High Voltage Overhead Lines" (2s.). F.I.A.T. 1162, "Steel Production by Vacuum Electric Furnace at Heraeus Vacuumschmelze, Hanau (1s.). B.I.O.S./JAP/PR/116, "Electrical Equipment and Accessories for Japanese Aircraft" (1s. 3d.).

Next Week's Events

Monday, December 1st

BIRMINGHAM.—James Watt Memorial Institute, Great Charles Street, 6 p.m. I.E.E. South Midland Centre. "Neutral Earthing of Three-Phase Systems, with particular reference to Large Power Stations," by J. R. Mortlock and C. M. Dobson.

LIVERPOOL.—At the Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "The Application of Electrical Technique to the Service of some other Industries," by H. Cobden Turner and G. M. Tomlin.

MANCHESTER. — Engineers' Club, Albert Square, 6.30 p.m. I.E.E. North-Western Students' Section. "Brains Trust" and "quiz." Joint meeting with the North Western Graduates' Section of the I. Mech. E.

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. Discussion on "Remote Metering Systems for Continuous Indication," to be opened by A. P. M. Montgomery and J. W. Faulkner.

Tuesday, December 2nd

CAMBRIDGE. — Cambridgeshire Technical College, 6 p.m. I.E.E. Cambridge Radio Group. "Industrial Applications of Electronic Techniques," by H. A. Thomas.

LEEDS.—Corporation Electricity Department, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. "Record of Experience on the Irish Electricity Supply System" by A. Burke, R. C. Cuffe, and W. O'Neill.

LONDON.—The Oddfellows' Hall, 186, Hammersmith Road, S.W., 7 p.m. Association of Supervising Electrical Engineers (West London Branch). "Lighting—Design and Installation," by W. E. Smith and T. Mayhew.

LONDON.—L.T.R. Headquarters Refreshment Club, Waterloo Bridge House, S.E.1, 5 p.m. Institution of Post Office Electrical Engineers (London Centre). Informal meeting. "Some new Ideas on Test Room Procedure," by B. H. Moore.

LOUGHBOROUGH.—The College, 6.30 p.m. I.E.E. East Midland Centre. "Commercial Development of Electricity Supply as a Consumer Service," by C. T. Melling.

MANCHESTER.—Women's Engineering Society (Manchester Branch), 6.30 p.m. Visit to Richard Johnson & Nephew, Ltd., Forge Lane.

MANCHESTER. — Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Centre. "Electric Traction on the Southern Railway," by C. M. Cock.

Wednesday, December 3rd

BIRMINGHAM.—James Watt Institute, Great Charles Street, 7 p.m. Junior Institution of Engineers (Midland Section). "Impressions of Power Plant Development in the U.S.A.", by L. F. Jeffrey.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "The Design and Operation of High-Power Broadcast Transmitter Units with their Outputs Combined in Parallel," by T. C. Macnamara, A. B. Howe and P. A. T. Bevan.

LONDON.—I.E.E. Students' Section. Visit to Hampton Pumping Station of the Metropolitan Water Board.

MIDDLESBROUGH.—Cleveland Scientific and Technical Institute, 6 p.m. I.E.E. Tee-Side Sub-Centre. "Electric Traction on the Southern Railway," by C. M. Cock.

SOUTHSEA.—City Council Chambers, Clarence Parade, 6.30 p.m. I.E.E. Southern Centre. "Industrial Applications of Electronic Techniques," by H. A. Thomas.

Thursday, December 4th

BIRMINGHAM.—Botanical Gardens, Edgbaston, Institution of Heating and Ventilating Engineers (Birmingham and District). Annual dance.

LEICESTER.—Electricity Offices, Charles Street, 6.45 p.m. Leicester Electrical Society. "Television," by A. Folwell.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. "Speech Communication under Conditions of Deafness or Loud Noise," by Dr. W. G. Radley.

Friday, December 5th

BIRMINGHAM.—Imperial Hotel, Temple Street, 6 p.m. Illuminating Engineering Society (Birmingham Centre). Discussion on "Lighting and Industrial Decoration," to be opened by A. L. Hall and S. D. Lay. Joint meeting with the Institution of Production Engineers.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. Discussion on "Economics of Metering," opened by M. Whitehead.

MANCHESTER. — Engineers' Club, Albert Square, 6.45 p.m. Manchester Association of Engineers. "Electronics — A Survey for Mechanical Engineers," by A. B. Race.

NOTTINGHAM.—George Hotel, George Street. Institution of Heating and Ventilating Engineers (East Midlands Branch). Annual dinner and dance.

Saturday, December 6th

BOURNEMOUTH.—The Pavilion, 2.30 p.m. I.E.E. Southern Centre. "The Application of Electrical Technique to the Service of some other Industries," by H. Cobden Turner and G. M. Tomlin.

MANCHESTER.—At the Geographical Society, 16, St. Mary's Parsonage, 2.30 p.m. Junior Institution of Engineers (North Western Section). "Substation Equipment and Operation," by J. L. Breedon.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.*2.

1941

MARCONI'S Wireless Telegraph Co., Ltd.—" Photo-electric electron multiplier." 13019. October 8th, 1940. (594338.)

1943

Western Electric Co., Inc.—" Silicon rectifying elements." 15659. March 27th, 1941. (594121.)

J. G. Daunt, D. Roaf and C. S. Wright.—" High-frequency electrical oscillators." 16668. October 12th, 1943. (594284.)

General Electric Co., Ltd., E. Friedlander and J. W. Howard.—" Electric power transmission apparatus for ship propulsion." 19027. November 15th, 1943. (594342.)

1944

General Electric Co., Ltd., and C. J. O. Garrard. — " Fluid-blast electric circuit breakers." 1789. January 31st, 1944. (594122.)

Marconi's Wireless Telegraph Co., Ltd.—" Electronic relays and wave generators." 3024. May 30th, 1942. (594343.) " Radio beacon systems." 10685. November 2nd, 1942. (594288.) " Electric oscillation generators." 23873. September 27th, 1943. (594351.)

J. H. Mitchell.—" Methods of measuring distance by means of the reflection of radio waves having particular application by radio altimeters." May 6th, 1944. (594346.)

Western Electric Co., Inc.—" Electric discharge devices." 3579. December 15th, 1942. (594344.)

Marconi Instruments, Ltd., W. B. Bartley and C. F. Brockelsby.—" Automatic weighing device." 10801. June 5th, 1944. (594289.)

H. Hyman.—" Portable electric flashlights." 16868 and 17602. (594297 and 594299.)

Sperry Gyroscope Co., Inc.—" Apparatus for determining the phase relationship between two periodically varying electrical quantities." 17608. September 6th, 1943. (594132.)

R. E. Stark and D. E. Stark.—" Variable intensity light signalling apparatus." 18456. September 27th, 1944. (594300.)

Electro Manganese Corporation.—" Electrowinning of manganese." 22458. January 22nd, 1944. (594304.)

A. West & Co., Ltd., F. J. Pavitt and H. H. Matthews.—" Electric motor control systems." 24198. December 4th, 1944. (594352.)

Standard Telephones & Cables, Ltd.—" Party line ringing arrangements for automatic telephone exchange systems." 24601. March 2nd. 1944. (594137.)

1945

Marconi's Wireless Telegraph Co., Ltd.—" Variable inductance devices and tuning arrangements including such devices." 2783. February 5th, 1944. (594314.) " Means for supplying a high regulated voltage from a low voltage direct current source." 4713. February 24th, 1944. (594358.)

R. M. Chamney.—" Electrical cable construction." 2972. February 6th, 1945. (594233.)

Standard Telephones & Cables, Ltd.—" Interference reducing system for radio signalling." 3049. April 16th, 1943. (594235.)

F. P. Wills.—" Electric tachometers." 3623. February 13th, 1945. (594144.)

Morris Motors, Ltd., J. H. Bridle and R. J. Brown.—" Electrical heating apparatus." 4772. February 26th, 1945. (594317.)

T. Price & Son (Stampers), Ltd., and E. E. Price.—" Electric immersion heaters." 4836. February 27th, 1945. (594359.)

Westinghouse Electric International Co.—" Electric power systems for ship propulsion and other purposes." 5245. June 8th, 1943. (594238.)

Instanta Electric, Ltd., and W. S. F. Brown.—" Means for straightening and/or tensioning leaf springs of the type used for telephone contact assemblies, as employed on telephone or like equipment particularly on relays, cam-operated switchgear, key switches and the like." 7312. March 22nd, 1945. (Cognate application 14032/45.) (594241.)

J. Roberts.—" Rotary electric fuse-switches." 9558. April 17th, 1945. (594324.)

Farnsworth Television and Radio Corporation.—" Colour flicker reducing apparatus for colour television receivers." 9862. February 28th, 1944. (594327.)

W. W. Triggs (Farnsworth Television & Radio Corporation).—" Magnetic deflecting systems for cathode-ray tubes." 11019. May 1st, 1945. (594334.)

Superheater Co., Ltd., and D. W. Rudorff.—" Apparatus for testing materials by magnetic or electrical analysis." 11552. May 7th, 1945. (594158.)

Siemens Bros. & Co., Ltd., L. S. Crutch, J. H. Mole and W. C. Newman.—" Electric signalling systems employing thermionic valves." 11913. May 11th, 1945. (594159.) " Electric signalling systems." 11914. May 11th, 1945. (594160.)

Soc. Française Radio-Electrique.—" Electric discharge valves." 11933. November 19th, 1943. (594161.)

M. Squires.—" Apparatus for simulating

torsional oscillations in rotating members for testing and calibrating a.c. generator pick-ups." 12569. May 18th, 1945. (594163.)

Ferranti, Ltd., and M. K. Taylor.—" Recording of sound." 12981. May 24th, 1945. (594164.)

Allmanna Svenska Elektriska Aktiebolaget.—" Balanced electric relays or switches." 13277. June 9th, 1944. (594254.)

Aktiebolaget Elektrolux. — " Electrically driven fans." 13406. July 12th, 1944. (594165.)

Electromagnets, Ltd., W. E. Box and J. T. Claridge.—" Magnetic separators." 13536. May 30th, 1945. (594255.)

Precision Developments Co., Ltd., and G. Olah.—" Arc-suppressing arrangements for electric switching devices." 13648. May 31st, 1945. (594256.)

Precision Developments Co., Ltd., and G. Olah.—" Contact arrangements applicable to electric follow-up switches." 13864. June 1st, 1945. (Addition to 556288.) (594258.)

Compagnie Générale de Télégraphie sans fil. —" Band stop filters for electromagnetic waves." 13730. December 14th, 1943. (594368.)

Callender's Cable & Construction Co., Ltd., J. Taylor, T. L. Osborne and E. Tunnicliff.—" Manufacture of insulated electric conductors." 14496. June 8th, 1945. (594371.)

Standard Telephones & Cables, Ltd., and W. K. Weston.—" Repeatered submarine signalling cables." 15416. June 18th, 1945. (594171.)

English Electric Co., Ltd., and R. K. Whitehead.—" Adjusting the rental charge in prepayment mechanism." 15451. June 18th, 1945. (594264.)

Wolf Safety Lamp Co. (Wm. Maurice), Ltd., and P. A. Roedel.—" Contact plates for electric battery lamps." 15710. June 20th, 1945. (594377.)

Philips Lamps, Ltd., and R. A. F. Bouette.—" Wire-cutting pliers." 16289. June 26th, 1945. (594271.)

W. T. Henley's Telegraph Works Co., Ltd., and J. Harvey.—" Manufacture of insulated electric conductors." 16354. June 27th, 1945. (594175.)

Arrow Electric Switches, Ltd.—" Rotary electric selector switch." 16371. July 7th, 1944. (594177.)

English Electric Co., Ltd., and E. A. Binney. —" D.c. electric motor control systems." 16390. June 27th, 1945. (594272.)

W. L. Spence.—" Electric motor control gear for variable pitch propellers and the like." 16455. June 28th, 1945. (594190.)

A. W. Godden.—" Radio receivers." 16465. May 16th, 1946. (594192.)

R. E. Thompson & Co. (Sunbury), Ltd., and J. B. Andrews.—" Snap-action electric switches." 16469. June 28th, 1945. (594194.)

Radio Corporation of America.—" Apparatus for producing hardened optical coatings by electron bombardment." 16525. May 1st, 1944. (594201.)

Svenska Turbinfabriks Aktiebolaget Ljungström.—" Tightening device for radial flow elastic fluid turbines or compressors." 16533. October 23rd, 1944. (594203.) " Blade ring for radial flow elastic fluid turbines and method of manufacturing same." 16534. July 5th, 1944. (594204.)

Metropolitan-Vickers Electrical Co., Ltd., and J. F. Shannon.—" Power plant and transmission gearing therefor." 16554. June 28th, 1945. (594205.)

Metropolitan-Vickers Electrical Co., Ltd., and D. M. Smith.—" Internal combustion turbine plant for propulsion." 16555/6. June 28th, 1945. (594206/7.)

Telephone Manufacturing Co., Ltd., and C. O. L. Ward.—" Wound electrical condensers." 16630. June 29th, 1945. (594224.)

Standard Telephones & Cables, Ltd.—" Indicator for an image displayed on the screen of a cathode-ray tube." 16654. August 9th, 1944. (594382.)

Maschinenfabrik Oerlikon.—" High-tension gas-blast circuit-breakers." 16965. July 17th, 1944. (594386.)

Standard Telephones & Cables, Ltd., and M. M. Levy.—" Holders for thermionic valves." 17036. July 4th, 1945. (Addition to 549301.) (594277.)

Babcock & Wilcox, Ltd., and R. E. Zoller.—" Vapour generating and heating units." 17272. July 6th, 1945. (594389.)

Amended Specification

566067. Flowerdale, Ltd., and others.—" Generation, amplification, or frequency alteration of high-frequency electric oscillations."

Trade Marks

APPLICATION has been made for the registration of the following trade marks. Objections may be entered within one month from November 19th:—

WINCO (design.) No. 644,794. Class 7. Portable compressors (being pumps) combined with electric motors.—Winchester Machine Tool Co., Ltd., 294-6, Lillie Road, Fulham, London, S.W.6.

ELEKTRO-HELIOS. No. B648,339. Class 9. Electrical apparatus and appliances included in Class 9, all employing an electric heating element, and electric heating elements for these goods; thermostats, adaptors, plugs and flexible conductors.—Elektriska Aktiebolaget Helios, Stockholm. Address for service: c/o J. Y. & G. W. Johnson, 47, Lincoln's Inn Fields, London, W.C.2.

MONOVOX. No. 651,454. Class 10. Electro-medical acoustic apparatus, hearing aids for the deaf, medical instruments and apparatus for detecting and estimating the degree of deafness, and parts included in Class 10 of all such goods.—Amplivox, Ltd., 2, Bentinck Street, Manchester.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Brentwood.—December 16th. U.D.C. Two vertical spindle centrifugal pumps and electric motors, with float-operated switchgear, etc., for the Northern Area main drainage scheme.—Surveyor, Council offices, Ingrave Road.

Epsom and Ewell.—January 19th. Electricity Department. H.v. and l.v. cable and h.v. switch gear and transformers. (See this issue.)

Farnworth.—December 10th. Electricity Department. Steel substation kiosk, two 500-kVA transformers, 11-kV switchgear, meters, overground pillar boxes and underground boxes. (November 21st.)

India. — DELHI. — December 18th. Delhi Central Electric Power Co., Ltd. 6,600-V, 400-V and multicore cables. (November 21st.)

Newcastle-on-Tyne. — Corporation. Music relay apparatus. (See this issue.)

Plymouth.—December 20th. Town Council. Six circulating water pumps and motors.—City electrical engineer, Armada Street.

Walsall.—January 2nd. Electricity Department. One 500-kW mercury-arc rectifier, one 550-V d.c. switchboard and one remote supervisory control equipment. (See this issue.)

Orders Placed

Bootle. — Corporation Recommended. Sodium street lighting equipment :—Time switches and fuses (£178) and steel poles and brackets (£3,099).—Wardle Engineering Co. Lamps (£608), control boxes (£1,224) and lanterns (£554).—Revo Electric Co. Cables (£609).—Mersey Cable Co.

East Sussex.—County Council. Installation of electric lighting at the East Grinstead County Primary and Modern Schools.—A. & C. Bridgland.

Stockton-on-Tees.—Electricity Committee. Accepted. H.v. and l.v. switchgear, transformers and cables for Boathouse Lane industrial site.—A. Reyrolle & Co., W. Lucy & Co.; C. A. Parsons; Edison Swan Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashton-in-Makerfield.—Secondary school for Lancashire E.C.; G. Noel Hill, county architect, County Offices, Preston.

Balham.—Four blocks, containing 87 flats, for Wandsworth B.C., in Balham High Road; R. G. Covell, 5, Mitcham Road, S.W.17.

Barnsley.—Pithead baths, Dearne Valley Colliery, New Houghton, for Miners' Welfare Commission; C. G. Kemp, architect, 5, Old Queen Street, London, S.W.1.

Bermondsey.—Rebuilding part of tannery of Barrow, Hepburn & Gale, Ltd., Grange Road and Pages Walk; Leighton & Higgs, 9, St. Thomas's Street, S.E.1.

Bolton.—Extensions, Thornleigh Catholic College, Sharples, for managers; H. Greenhalgh, architect, 15, Mawdsley Street.

Extensions to Great Lever C. of E. schools (£12,500); Thorpe & Whyman, architects, Barclays Bank Buildings, Oldham.

Chertsey.—New villa for patients at Botleys Park Colony (£32,000); county architect, County Hall, Kingston-on-Thames.

Chiswick.—Rebuilding Nurses' Home, St. Mary's Convent and Hospital; F. Rowntree & Sons, 62, George Street, W.1.

Coventry.—Hospital buildings, Stoney Stanton Road, for Coventry and Warwickshire Hospital Board (£110,000); W. S. Hattrell & Partners, architects, 1, Queen's Road.

Droylsden.—Girls' secondary school (£178,620); county architect, County Offices, Fishergate Hill, Preston.

Dudley.—Houses (52) for T.C., Lodge Farm site; Sir Alfred McAlpine & Sons, Ltd., Hooton, near Chester.

Easingwold.—Houses (30), Galtres Estate, for R.D.C.; Needham & Thorp, architects, 6, High Petergate, York.

Edinburgh.—Reconstruction of biscuit factory at Leith (£12,000), for Scribbans-Kemp (Scotland), Ltd.; the manager.

Hartlepool (Co. Durham).—Factory for disabled persons; C. S. Errington, 46, Grainger Street, Newcastle-on-Tyne.

Ipswich.—School at Whitton White House estate; Johns & Slater, 8, Lower Brook Street.

Lanarkshire.—Mechanical engineering research station at East Kilbride (£1,250,000); East Kilbride Development Corporation (Sir Patrick Dollan, Glasgow).

Leicester.—Extensions to nurses' training school, for Leicester Royal Infirmary Governors; G. Calverley & Sons (Contractors), Ltd., Evington Valley Road.

London.—New buildings, High Holborn and Fetter Lane corner, for "Daily Mirror" Newspapers, Ltd.; Anderson, Forster & Wilcox, architects, Stone Buildings, Lincoln's Inn, W.C.2.

Macclesfield.—Nurses' Home, West Park Hospital, for Cheshire C.C.; Cooper Bros. & John Clayton, Ltd., builders, Catherine Street.

Manchester.—Reinstatement after war damage, South-west block, Royal Eye Hospital, for Board of Governors; L. Brown & Sons, Ltd., builders, Wilmslow, Ches.

Works extensions, Williams Street and Lower Russell Street, Miles Platting, J. H. Peck & Co., Ltd.; W. Johnson & Son, architects, 27, Oldham Road, Miles Platting.

Middlesbrough.—Extensions for Tees-side Bridge & Engineering Co., Ltd., Thorrold Terrace.

Milnthorpe.—Primary school (£41,000); county architect, Exchange Chambers, Kendal.

Motherwell.—Extensions at silk factory £17,350), for Anderson & Robertson, Factory Road; the manager.

Mountnessing (Essex).—Corset factory, Burnthouse Lane; H. P. Callaway, Ltd., 26, Florida Street, London, E.C.2.

Nantwich.—Houses (36), for R.D.C.; T. Platt, builder, Shavington, near Crewe.

Nottinghamshire.—Extensions and alterations o Brackenhurst Hall for use as farm institute £26,000); county architect, Nottingham.

Ormskirk.—Agricultural houses (32), County Road; U.D.C. surveyor, Burscough Street.

Padgate.—School for Cheshire E.C. (£90,000); E. M. Parkes, county architect, The Castle, Chester.

Pakenham (Suffolk).—Houses (40), for Thingoe R.D.C.; surveyor, County Chambers, Hatter Street, Bury St. Edmunds.

Rochdale.—Nurses' Training School, Foxholes, for Birch Hill Hospital, for T.C.; G. Margolis & Co., builders, Heywood Street, Manchester, 8.

Sanderstead.—County primary school at Hamsey Green (£67,912), for Surrey C.C.; Walker (Tooting), Ltd., contractors, 99, Beddington Lane, Croydon.

South Shields.—Secondary school, Prince Edward Road; J. H. Morton & Son, Martins Bank Chambers, Fowler Street.

Stockport.—Extensions for Mattinson Bros., Ltd., Excel Works, Wellington Street.

Sunderland.—Rebuilding of the Atlas Cabinet Works (£10,000); Stephenson & Gillis, Saville Chambers, Newcastle-on-Tyne.

Factory for disabled persons at Pallion; C. S. Errington, 46, Grainger Street, Newcastle-on-Tyne.

Swansea.—New primary school at Cadle; H. T. Wykes, borough architect, The Guildhall.

Walsall.—The factory extensions reported in our issue of October 31st relate to Wilmot Bennet, Ltd., Marsh Street. We regret any inconvenience caused to Wilmot Breeden, Ltd.

Watford.—Secondary school at Oxhey (£180,000); county architect, County Offices, Castle Street, Hertford.

Welling.—County primary school, Apple Avenue, for Kent C.C.; Kent & Sussex Contractors, Ltd., Station Road, Sidcup.

Wigan.—Municipal school at Pemberton, for Wigan E.C.; D. M. McKellen, borough engineer.

Wolverhampton.—Mental Hospital at Seisden for Staffordshire Mental Hospital Board; C. M. Coombs, county architect, County Buildings, Stafford.

School, Bushbury South estate, for T.C.; Wm. Whittingham, builder, Powlett Street.

Municipal Reports

Cannock.—Because of the institution of continuous meter reading the recorded sales last year do not fully reflect the growth in consumption. Nevertheless, the increase of 3·4 million kWh sold (12·5 per cent) was the highest in the history of the undertaking. Altogether sales totalled 30·2 million kWh (equal to 604 kWh per head of the population), about half being e.h.v. bulk supplies the expansion of which was due to extra requirements of collieries and of other industrial consumers. The chief engineer and general manager (Mr. P. Wardle) expects a further increase in such supplies during the next few years. On the domestic side there was an unprecedented demand for electrical appliances of all kinds and the value of such equipment sold through the showrooms was almost twice as much as in any previous year.

Income rose by £13,475 to £136,767 and working expenses by £15,581 to £113,686, the net result being a profit of £2,055 (against £417), of which £1,684 is contributed to the rates. The average price received per kWh sold was 0·995d.

Norwich.—Besides increased costs and last winter's restrictions, factors which affected the undertaking's results include a further reduction in income from supplies to aerodromes. Such supplies last year amounted to 4·4 million kWh compared with 9 million in the previous year and 18·8 million two years ago. Also, development has been impeded by cable and material shortages which have made it necessary to refuse supplies to 1,300 potential consumers. Nevertheless there was a net surplus on the past year's operations, although substantially less than in 1945-46 (£1,869 against £20,334).

The undertaking (city electrical engineer, Mr. J. A. Sumner) sold altogether 123·8 million kWh, an increase of 9·4 million. Income rose by £108,818 to £887,537, while working costs advanced more sharply — by £141,845 to £767,603. On the other hand, loan charges and income tax decreased from £132,627 to £118,065. The average price received per kWh sold was 1·39d. (1·43d.).